248

PROPERTY OF
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3924 MEADE ST.
DENVER, COLORADO

CONTENTS

TRADE NAME	MODEL	SET AND FOLDER No.
Airline	GSE-3176A, B, GSE-3178A, B, GSE-3195A, B, GSE-3197A, B Tel. Rec. Prod. Chg. Bul. 102	248-1
Arvin	9211TM, -UHF, 9213TM, -UHF, 9215CM, -UHF (Ch. TE355, TE362) Tel. Rec.	248-2
Buick	981550	248-3
Dewald	H-533	248-4
Dukane	11A75 Recorder	248-5
Emerson	778-B (Ch. 120199B)	248-6
Fleetwood	610 Tel. Rec.	248-7
Knight	SX19L720	248-8
RCA Victor	17-T-301, U, 17-T-302, U, 17-T-310, U (Ch. KCS78, A, B) Tel. Rec. Prod. Chg. Bul. 102	248-1
Sylvania	331, U, 336M, U (Ch. 1-513-1, -2, -3, -4) Tel. Rec.	248-9
Truetone	2D1359A (Series A, C, D, E) Tel. Rec.	248-10
V-M	990	248-11

SUPPLEMENTAL DATA TO PHOTOFACT FOLDER 10 IN SET 206

RCA Victor models 17-T-301, 17-T-302, 17-T-310 (Ch. KCS78), 17-T-301U, 17-T-302U and 17-T-3100 (Ch. KCS78B) are covered in Photofact Folder 10, Set 206.

Ch. KCS78A

Chassis KCS78A is used in later production of models 17-T-301, 17-T-302 and 17-T-310. This chassis is identical to Ch. KCS78, except the KRK22A tuner is used. A schematic of this tuner is given below. Alignment instructions for this tuner are given on the reverse side.

Ch. KCS78, A,B

In later production of Ch. KCS78, A, B the following changes were made:

C38, pin 6 of V4, was changed from 470MMF to 1000MMF.

In some receivers a filament choke (part #73477) was added between pin 3 of V5 to point X. L25 is then connected to pin 3 of V5 instead of to point X.

R44, V7 screen resistor, was changed from 5.6KΩ to 8.2KΩ.

R86 was changed from 3.9KΩ to 4.7KΩ.

R88 was connected to ground instead of to 130 volts.

R91 was 100KΩ in some chassis.

In some chassis a type 6CF6 tube is used for first and second video IF amplifier (V3 and V4). Pin connections for the 6CF6 and 6CB6 are the same.

In some chassis V14 was changed from a type 12AU7 to a type 6SN7GT tube.

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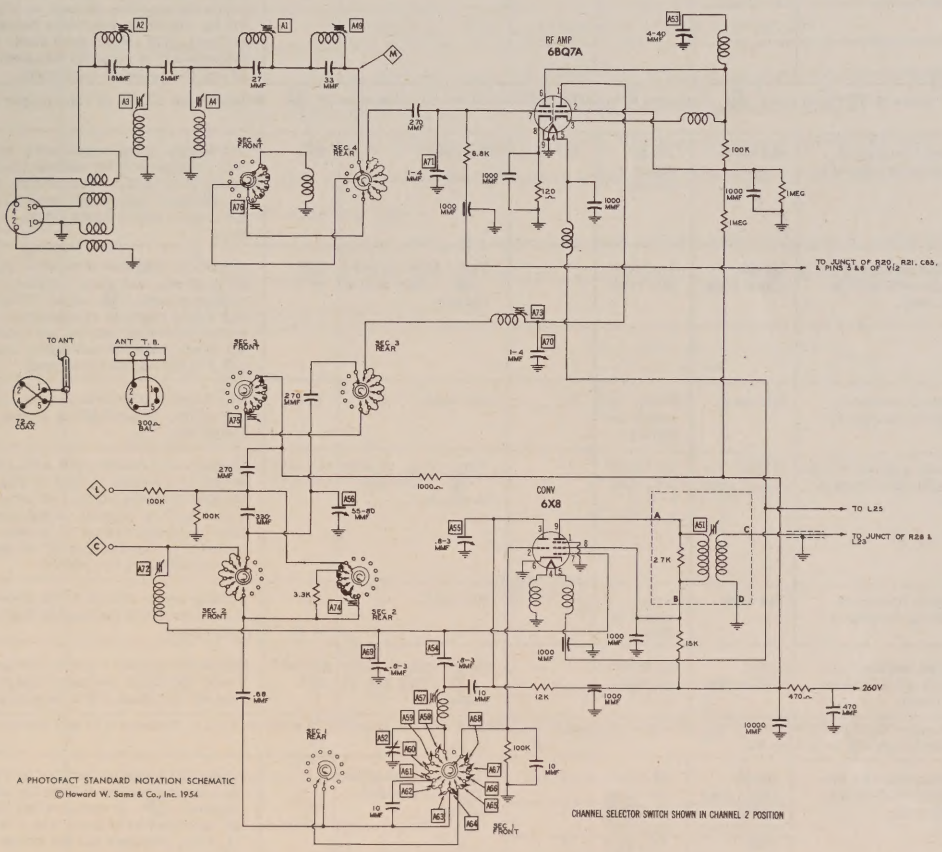

RCA VICTOR MODELS 17-T-301 (Ch. KCS78, A), 17-T-301U (Ch. KCS78B), 17-T-302 (Ch. KCS78, A), 17-T-302U (Ch. KCS78B), 17-T-310 (Ch. KCS78, A), 17-T-310U (Ch. KCS78B)

PRODUCTION CHANGES
BULLETIN 102

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An RF unit which is operative and requires only minor touch-up adjustments will require no presetting of adjustments. When complete alignment is necessary make the following pre-adjustments:

1. Preset A52 all the way out.
2. Set channels 7 to 13 oscillator slugs one tuner from tight.
3. Adjust A51 so that the slug is all the way out.

Disconnect the link from terminals "A" and "B" of L23 and terminate the link with a 39Ω carbon resistor.
Tuner alignment as outlined below requires the use of a heterodyne frequency meter. The limits of oscillator injection voltage are 2 volts minimum and 5.5 volts maximum measured at point Ⓜ with VTVM.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
43.	Direct	High side to point Ⓛ. Low side to chassis.	Not used	42MC (400~Mod)	2	Vert. Amp. to point Ⓜ. Low side to chassis.	A53	To be sure that 42MC trap is adjusted with zero bias. Short tuner AGC terminal to ground. Set scope gain to maximum. Adjust signal generator for maximum output. Adjust A53 for MINIMUM 400~ indication on scope. If necessary, A53 may be retouched in field to provide additional rejection at a specific frequency. Exercise care so that A53 is not tuned into channel 2 reducing that channel's sensitivity. Remove short from tuner AGC terminal to chassis.
44.		RF input of heterodyne frequency meter to end of insulated wire inserted in hole provided for adjustment of A55.	"	Set Freq. meter to 227MC	8	Not used	A55, A52	Connect potentiometer arm of one of the bias supplies to the tuner AGC terminal. Connect positive lead to chassis. Adjust for -3 volts at tuner AGC terminal. Preset A53 for -3 volts on VTVM at point Ⓜ. Turn fine tuning control maximum clockwise. Adjust A55 for audible beat on frequency meter. Adjust A52 clockwise until beat note just begins to change then turn one full turn in same clockwise direction. Return fine tuning control to its mid-range position.
	NOTE: If channel 8 oscillator frequency cannot be reached by adjustment of A55, switch to channel 13 and adjust A57 for channel 13 oscillator frequency; then switch to channel 12 and adjust A58 for channel 12 oscillator frequency. Continue down to channel 8 adjusting proper oscillator trimmer to obtain proper oscillator frequency on each channel. Also, on channel 8, adjust A55 for channel 8 oscillator frequency. Switch to channel 13 and adjust A58; then switch back to channel 8 and adjust A55 again.							
45.	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	183MC (10MC Swp)	181.25MC 185.75MC	8	Vert. Amp. to point Ⓜ. Low side to chassis.	A69, A56 A70, A71	Set A51 fully counter clockwise. Set the scope gain to maximum and attenuate generator output for minimum input signal that will produce useable pattern on scope. Adjust for response similar to Fig. 9. Adjust A71 for maximum amplitude between markers. A70 affects pass band. A69 affects tilt (when A71 is properly adjusted). A56 affects the response band width.
46.	Connect the DC probe of VTVM to point Ⓜ. Common to chassis. Adjust A54 for -3 volts at point Ⓜ. Repeat steps 45 and 46 until proper response is obtained.							
47.		Connect frequency meter as in step 44.	Not used	Freq. meter to 257MC	13	Not used	A57	Rotate fine tuning control maximum clockwise. Adjust A57 for audible beat on freq. meter. SLIGHTLY overshoot the adjustment an additional turn in the same direction, then adjust A52 to again obtain an audible beat.
48.	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	"	Vert. Amp. to point Ⓜ. Low side to chassis.	A72 A73	Adjust for response similar to Fig. 9. Turn off generator and check oscillator injection voltage at point Ⓜ using VTVM as in step 46. If A54 required readjustment, turn sweep generator back on and recheck channel 13 response. If necessary, retouch A72 and A73 for desired response.
49.		Connect frequency meter as in step 44.	Not used	Freq. meter to 227MC	8	Not used	A52	Check for audible beat on freq. meter. If necessary, adjust A52 for proper oscillator frequency.
50.	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	183MC (10MC Swp)	181.25MC 185.75MC	"	Vert. Amp. to point Ⓜ. Low side to chassis.	A69, A56 A70, A71	If necessary, retouch A69, A56, A70 and A71 to obtain response similar to Fig. 9. If A69 required adjustment turn off generator and switch back to channel 13 and check oscillator injection voltage as in step 46. If necessary, repeat steps 48, 49 and 50 until proper response is obtained.
51.		Connect frequency meter as in step 44.	Not used	Freq. meter to 129MC	6	Not used	A64	Set fine tuning control to its mid-range position. Adjust A64 for audible beat on frequency meter.
52.	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	85MC (10MC Swp)	83.25MC 87.75MC	"	Vert. Amp. to point Ⓜ. Low side to chassis.	A74, A75 A76	Adjust for response curve similar to Fig. 9. Check oscillator injection voltage as in step 46. Readjust A54 if necessary.
53.	If A54 required adjustment, switch receiver and generator to channel 8. Readjust A69 for response similar to Fig. 9. Recheck A52 and A55 for proper oscillator frequency as in step 44.							
54.	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	85MC (10MC Swp)	83.25MC 87.75MC	6	Vert. Amp. to point Ⓜ. Low side to chassis.		Check for response similar to Fig. 9. Check oscillator injection voltage for each channel at point Ⓜ. If markers fall below 80% on any channel retouch A74, A75 and A76 to obtain response curves within proper limits.
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

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	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
55.	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. to point (M). Low side to chassis.		Check for response similar to Fig. 9. Check oscillator injection voltage for each channel at point (M). If markers fall below 80% on any channel, retouch A56, A69 and A32 to obtain response curves within proper limits.
			207MC (10MC Swp)	205.25MC 209.75MC	12			
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
56.		Connect frequency meter as in step 44.	Not used	257MC	13	Not used	A57	Adjust individual channel oscillator slug for audible beat on each channel. Recheck oscillator injection voltage on each channel at point (M) to verify that the voltage is within limits (2 volts minimum and 5.5 volts maximum).
				251MC	12		A58	
				245MC	11		A59	
				239MC	10		A60	
				233MC	9		A61	
				227MC	8		A62	
				221MC	7		A63	
				129MC	6		A64	
				123MC	5		A65	
				113MC	4		A66	
				107MC	3		A67	
				101MC	2		A68	

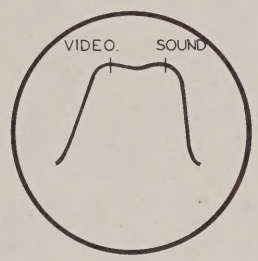

FIG.9

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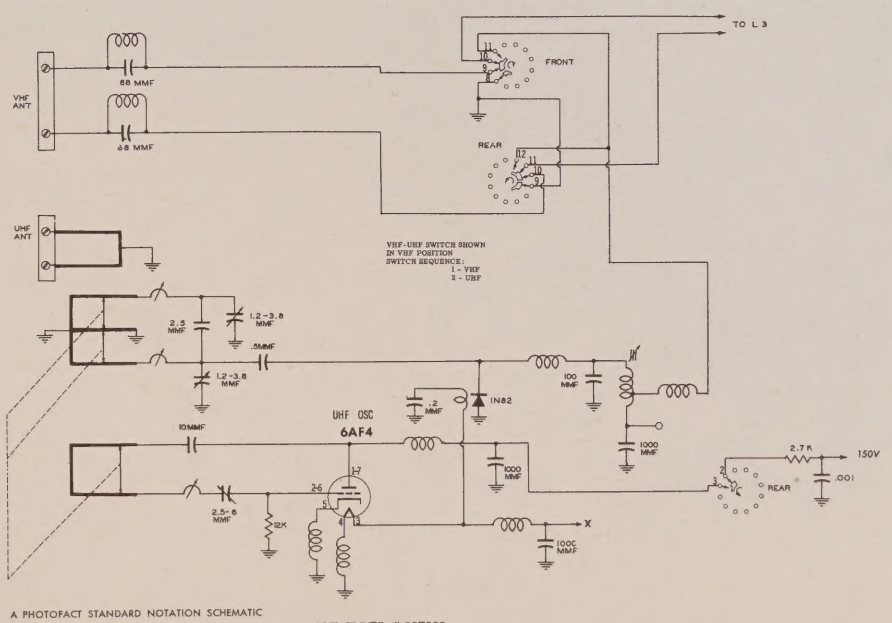
SUPPLEMENTAL DATA TO PHOTOFACT FOLDER 3 IN SET 238

Airline models GSE-3176A, GSE-3178A, GSE-3195A and GSE-3197A are identical to the models covered in Photofact Folder 3 - Set 238, except, a UHF tuner was added to the chassis.

When the UHF tuner is used a 13 position VHF tuner is also used with the VHF tuner functioning as a 40MC IF amplifier in the 13th position. A schematic of the new VHF and UHF tuners is given on the next page.

Models GSE-3176B, GSE-3178B, GSE-3195B and GSE-3197B are identical to models GSE-3176A, GSE-3178A, GSE-3195A and GSE-3197A, except a different UHF tuner (part #20E908) is used. A schematic of this tuner is given on below.



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UHF TUNER # 20E908

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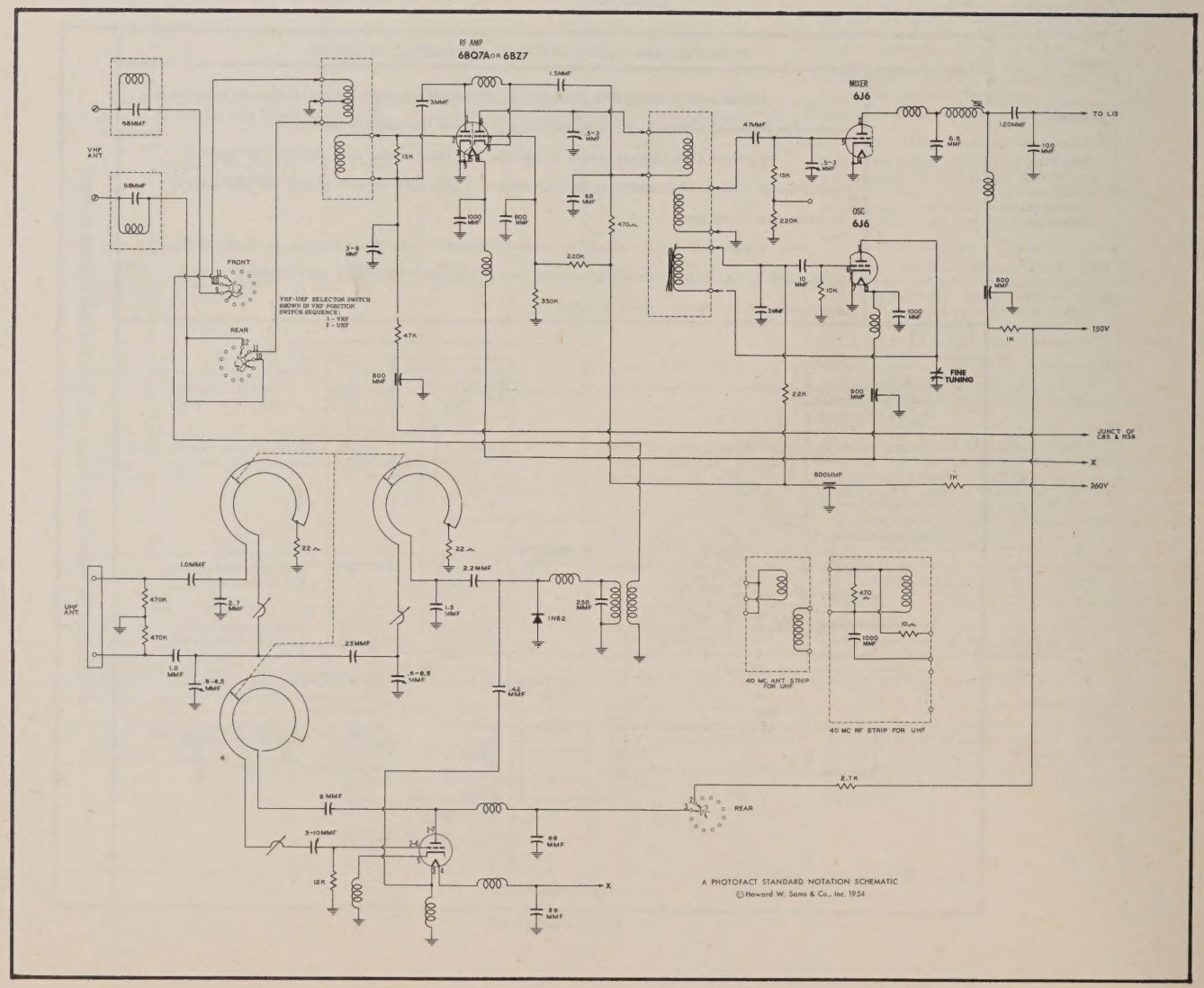
RF AMP
6BQ7A OR 6BZ7
MIXER
6J6
OSC
6J6
VHF ANT
UHF ANT
FRONT
REAR
VHF-UHF SELECTOR SWITCH
SHOWN IN VHF POSITION
SWITCH SEQUENCE:
1 - VHF
2 - UHF
FINE TUNING
TO L13
150V
260V
JUNCT OF C85 & R59
X
1NB2
40 MC ANT. STRIP FOR UHF
40 MC RF STRIP FOR UHF
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PHOTOFACT* Folder

ARVIN MODELS 9211TM, -UHF, 9213TM, -UHF, 9215CM, -UHF (Ch. TE355, TE362)

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The contents for this envelope will be found among the last folders in this complete set of folders . . . *unless* it has been purchased as part of a *complete* volume of PHOTOFACTS assembled in a DeLuxe Binder.

Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.

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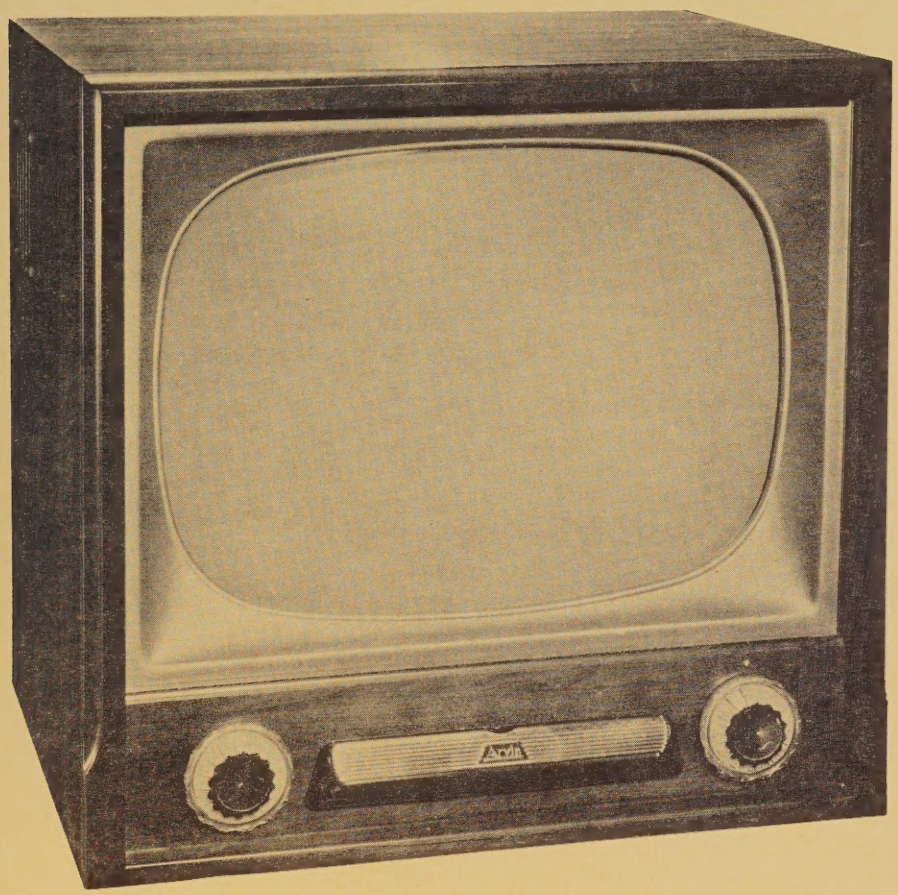

MODEL 9211TM

ARVIN MODELS 9211TM, -UHF, 9213TM, -UHF, 9215CM, -UHF (Ch. TE355, TE362)

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DATE 8–54 SET 248 FOLDER 2

ARVIN MODELS 9211TM, -UHF, 9213TM, -UHF, 9215CM, -UHF (Ch. TE355, TE362)

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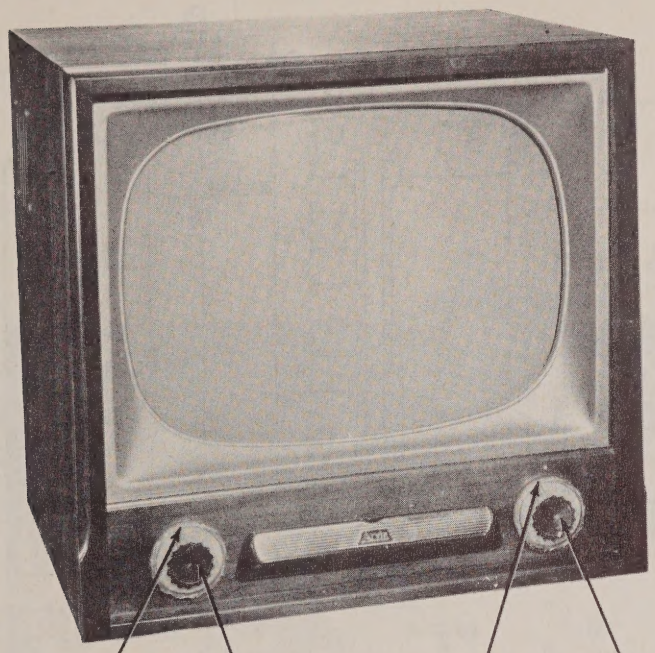

ARVIN MODEL 9211TM

TRADE NAME	Arvin Models 9211TM, 9213TM, 9215CM (Ch. TE355) 9211TM-UHF, 9213TM-UHF, 9215CM-UHF(Ch.TE362-UHF)
MANUFACTURER	Arvin Industries, Columbus, Indiana
TYPE SET	Television Receiver
TUBES	Twenty-two
POWER SUPPLY	110-120 Volts AC-60 Cycle RATING 2.32 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

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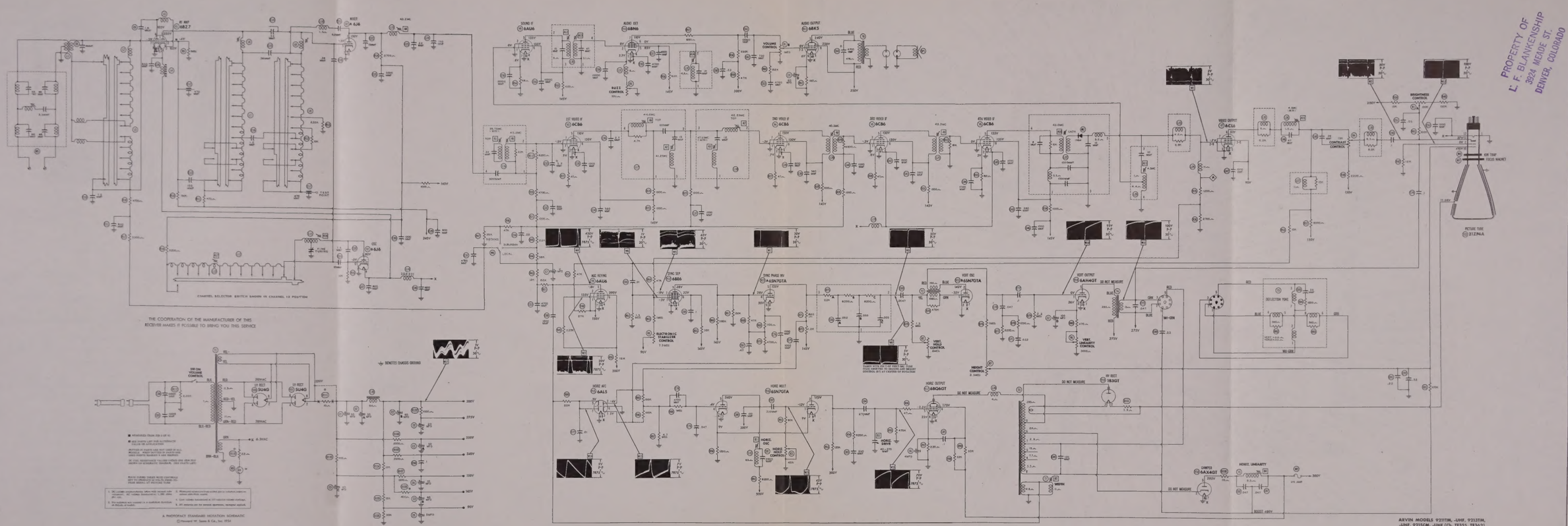
DATE 8-54 SET 248 FOLDER 2

ARVIN MODELS 9211TM, -UHF, 9213TM, -UHF, 9215CM, -UHF (Ch. TE355, TE362)


THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
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ARVIN MODELS 9211TM, -UHF, 9213TM, -UHF, 9215CM, -UHF (Ch. TE355, TE362)

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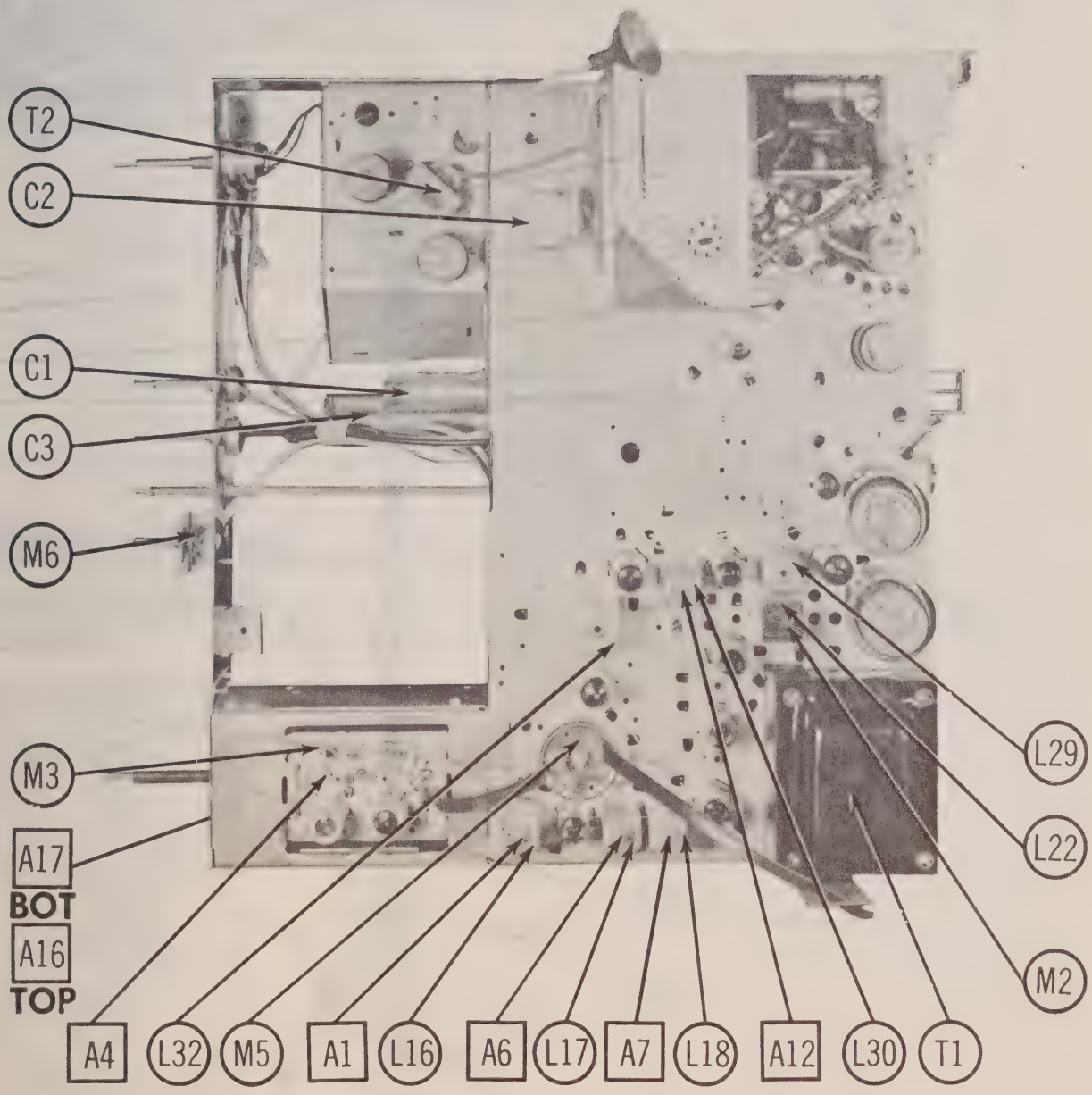

CHASSIS TOP VIEW

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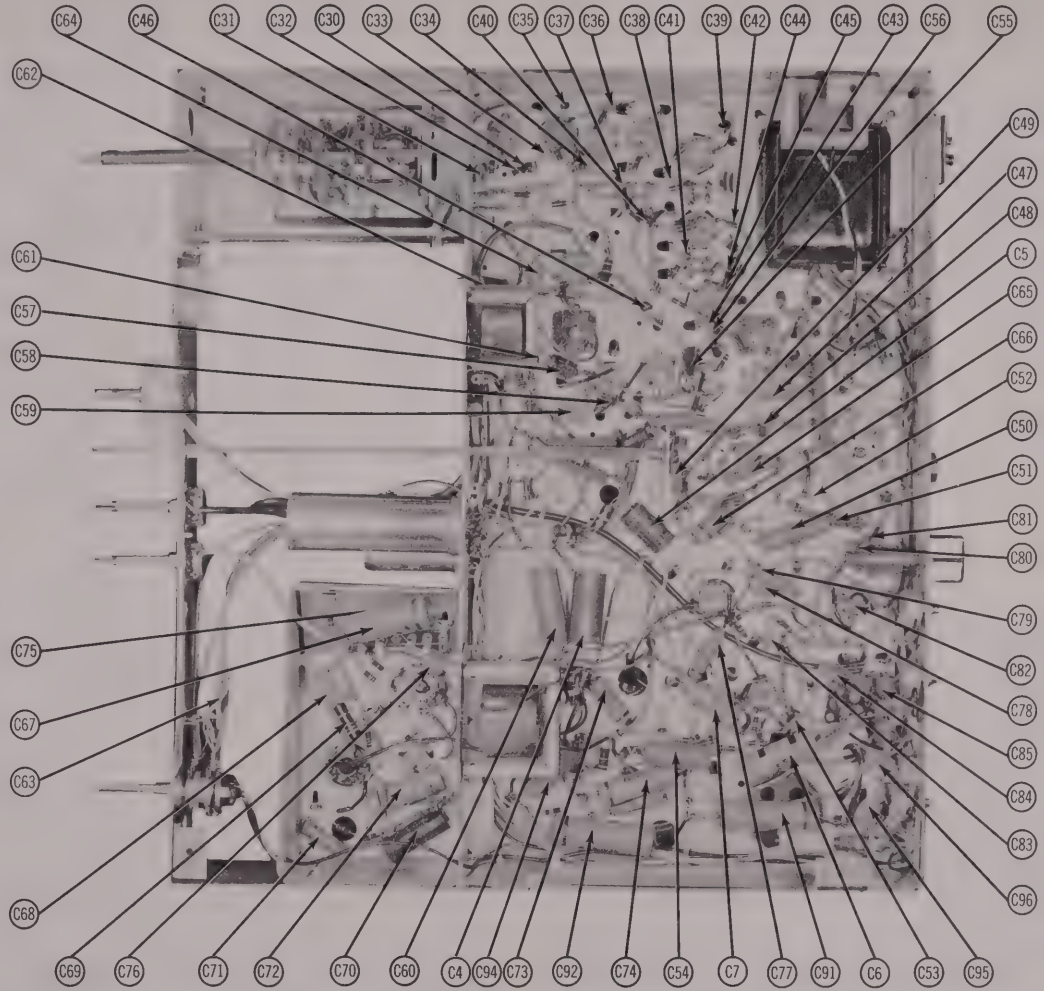

CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

TUBE PLACEMENT CHART

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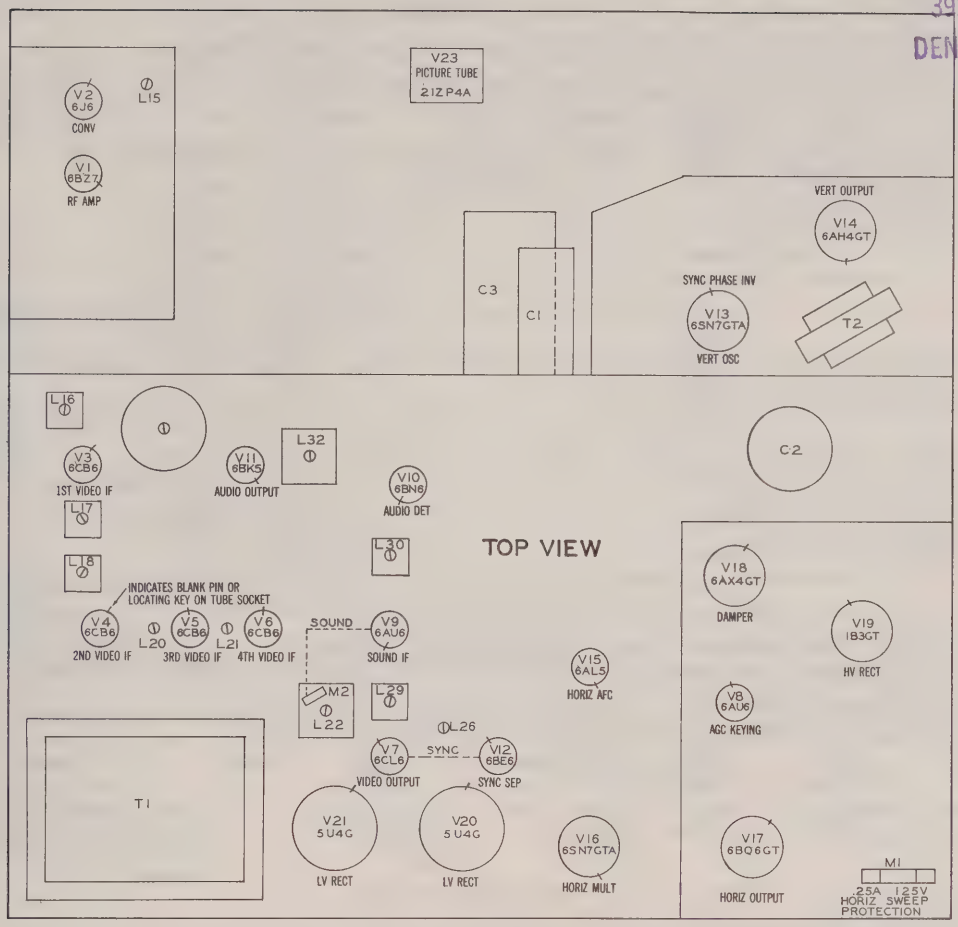

TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - V20, V21

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V2, V3, V4, V5, V6
No pic, no sound, has snow - V1, V2, V3
No pic, has sound, has raster - V7, V22
Has pic, no sound - V9, V10, V11
Overloaded picture - V8

SYNC FAILURE
No vert. sync - V13
No horiz. sync - V13, V15, V16
No vert. or horiz. sync - V12, V13

SWEEP FAILURE
No raster, has sound - V16, V17, V18, V19, V22, Fuse (M1)
No vertical deflection - V13, V14
Poor vert. linearity or foldover - V13, V14
Poor horiz. linearity or foldover - V16, V17, V18
Narrow picture - V16, V17, V18, V19, V20, V21
Vert. off freq. - V13
Horiz. off freq. - V13, V15, V16

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped and kept away from the chassis. Do not remove the horizontal oscillator tube (V16) to disable the high voltage.

VIDEO IF ALIGNMENT

Set the "Local-Distance-Suburban" switch to "Suburban" position.
Connect the negative lead of a 2.5 volt bias supply to the ungrounded side of C54. Connect the positive lead to chassis.
Remove the AGC keyer tube (6AU6), V8, from its socket.
Frequencies identified by an asterisk (*) should be used for aligning VHF-UHF chassis only.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	High side to an ungrounded tube shield floating over converter tube (V2). Low side to chassis.	39.75MC (Unmod)	9,10 or 11	DC probe thru 18KΩ to point (A). Common to chassis.	A1	Adjust for MINIMUM deflection.
2.	"	"	41.25MC	"	"	A2	"
3.	"	"	47.25MC	"	"	A3	"
4.	"	"	43.2MC * 42.8MC	"	"	A4	Detune A5 fully counter clockwise. Adjust A4 for maximum deflection.
5.	"	"	45.2MC * 45.0MC	"	"	A5	Adjust for maximum deflection.
6.	"	"	44.0MC	"	"	A6	Adjust for maximum deflection. If two peaks occur, use outer peak.
7.	"	"	42.2MC	"	"	A7	Adjust for maximum deflection. If two peaks occur, use outer peak. Repeat steps 6 and 7.
8.	"	"	40.3MC	"	"	A8	Adjust for maximum deflection.
9.	"	"	45.2MC	"	"	A9	"
10.	"	"	43.0MC	"	"	A10	Adjust for maximum deflection. Repeat steps 8, 9 and 10.

OVERALL VIDEO IF RESPONSE CHECK

Increase the bias to 3.5 volts at the ungrounded side of C54. Replace the converter tube shield to its normal position. Connect the high side of an RF signal generator to chassis near V3. Leave the low side disconnected. This generator is to be used to provide markers on the response curve.
Connect a 300 MFD capacitor across the input terminals of the vertical amplifier of the oscilloscope.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
11.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	195MC (10MC Swp)	41.25MC 42.25MC 45.0MC 45.75MC	10	Vert. Amp. thru 18KΩ to point (A). Low side to chassis.		Check for response curve similar to Fig.1. A9 positions the 45.75MC marker and A10 affects tilt. SLIGHT adjustment of A4 and A5 may be necessary to obtain desired response.

SOUND IF ALIGNMENT

Replace V8 in its socket.
Tune in a TV station and reduce signal into set until hiss is heard with sound. The signal input may be reduced by inserting an attenuator pad between the antenna lead-in and the antenna terminals. If an attenuator pad is not available disconnect the antenna lead-in and stray feed the signal by placing the lead-in near the set. Set the buzz control (R5) to its mid-range position and adjust A11, A12, A13 and A14 for clearest sound and minimum buzz. If the hiss should disappear during adjustment reduce the signal input to place the signal below the limiting level of the 6BN6 limiter detector.

SOUND IF ALIGNMENT USING ON THE AIR SIGNAL AND VTVM

Turn the set on and tune in a TV station.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
12.	Not used	Not used	Not used	Tune in any local channel	DC probe thru detector (Fig.2) to pin 2 (grid) of 6BN6 (V10). Common to chassis.	A11, A12 A13	Adjust for maximum deflection. Remove VTVM and detector probe. Set R5 to its mid-range position and adjust A14 for maximum sound. Readjust R5 for minimum buzz.

4.5MC TRAP ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
13.	.01MFD	High side to pin 9 (grid) of 6CL6 (V7). Low side to chassis.	4.5MC (Unmod)	Any non-interfering channel	DC probe thru detector (Fig.2) to junction of L21 and L22. Common to chassis.	A15	Adjust for MINIMUM deflection.

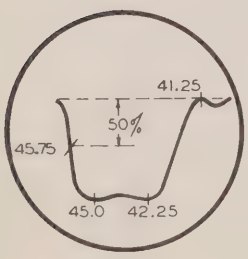

FIG.1

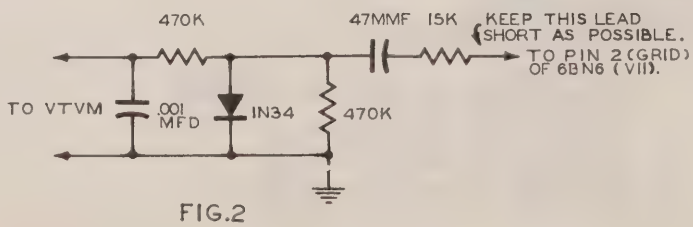

FIG.2

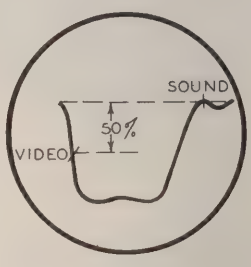

FIG.3

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ALIGNMENT INSTRUCTIONS (cont)

OSCILLATOR ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.
Connect the negative lead of a 3.5 volt bias supply to the ungrounded side of C54. Connect the positive lead to chassis. Remove V8 from its socket.

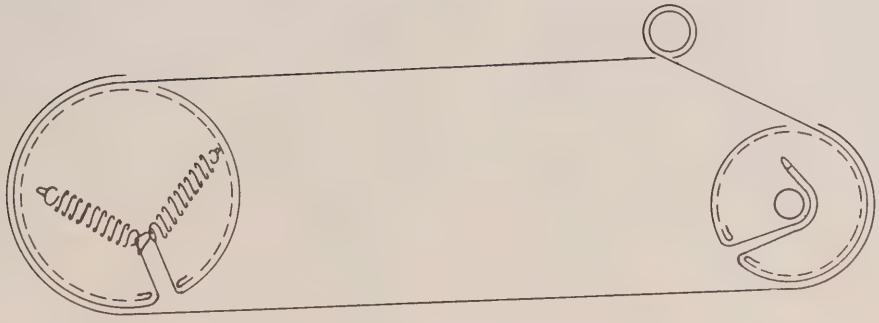
	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
14.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru 18KΩ to point (A). Low side to chassis.	A16	Adjust to place sound marker in trap notch as in Fig.3. Video marker should be at 50%.
15.	"	"	207MC (10MC Swp)	205.25MC 209.75MC	12	"		Check for sound and video marker placement as in Fig. 3. If necessary, make compromise adjustment of A16 for any individual channel, then recheck all other high band channels to see that they have not been seriously affected.
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75 MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
16.	"	"	85MC (10MC Swp)	83.25MC 87.75MC	6	"	A17	Adjust to place sound marker in trap notch as in Fig. 3. Video marker should be at 50%.
17.	"	"	79MC (10MC Swp)	77.25MC 81.75MC	5	"		Check for sound and video marker placement as in Fig.3. If necessary, make compromise adjustment of A17 for any individual channel, then recheck all other low band channels to see that they have not been seriously affected. Remove bias battery and replace V8 in its socket.
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

RF AND MIXER ALIGNMENT

The RF and mixer portion of this receiver has been properly aligned at the factory and is very stable. Alignment of this portion of the receiver should be required in the field.

UHF TUNER ALIGNMENT

Alignment of this portion of the receiver is not recommended in the field. Should the UHF tuner require major repair or alignment the entire UHF tuner unit should be returned to the factory.

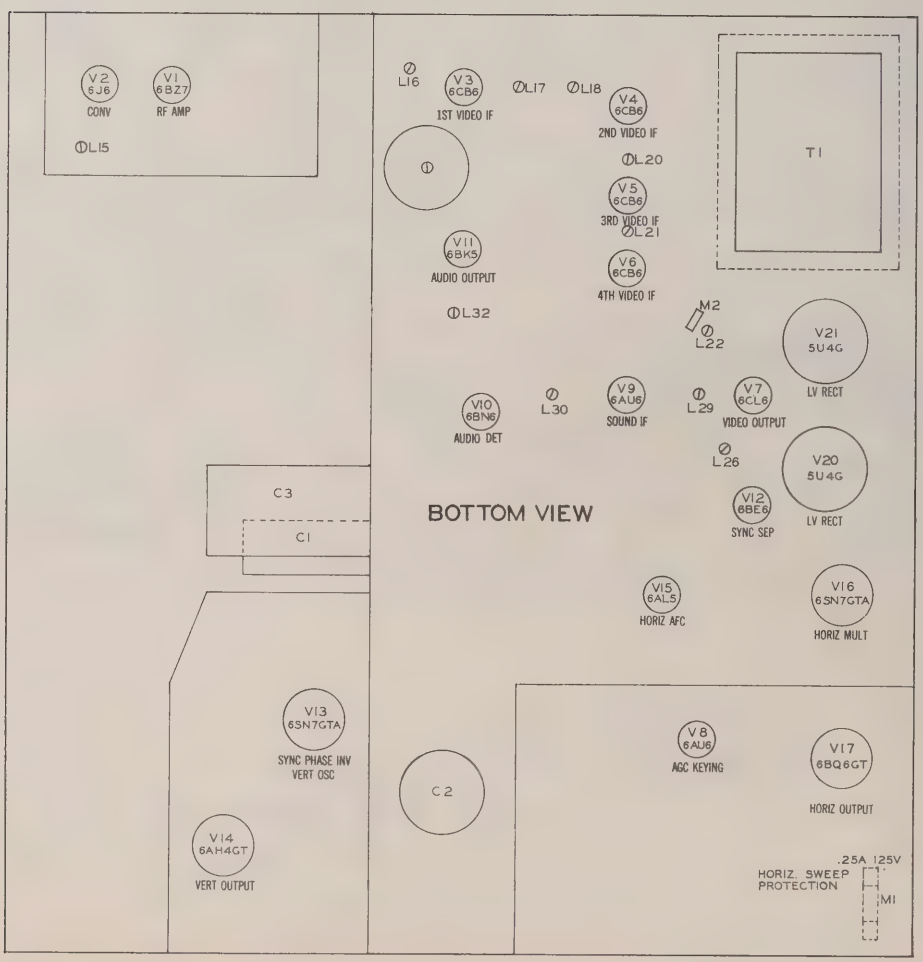


UHF DRIVE CORD STRINGING

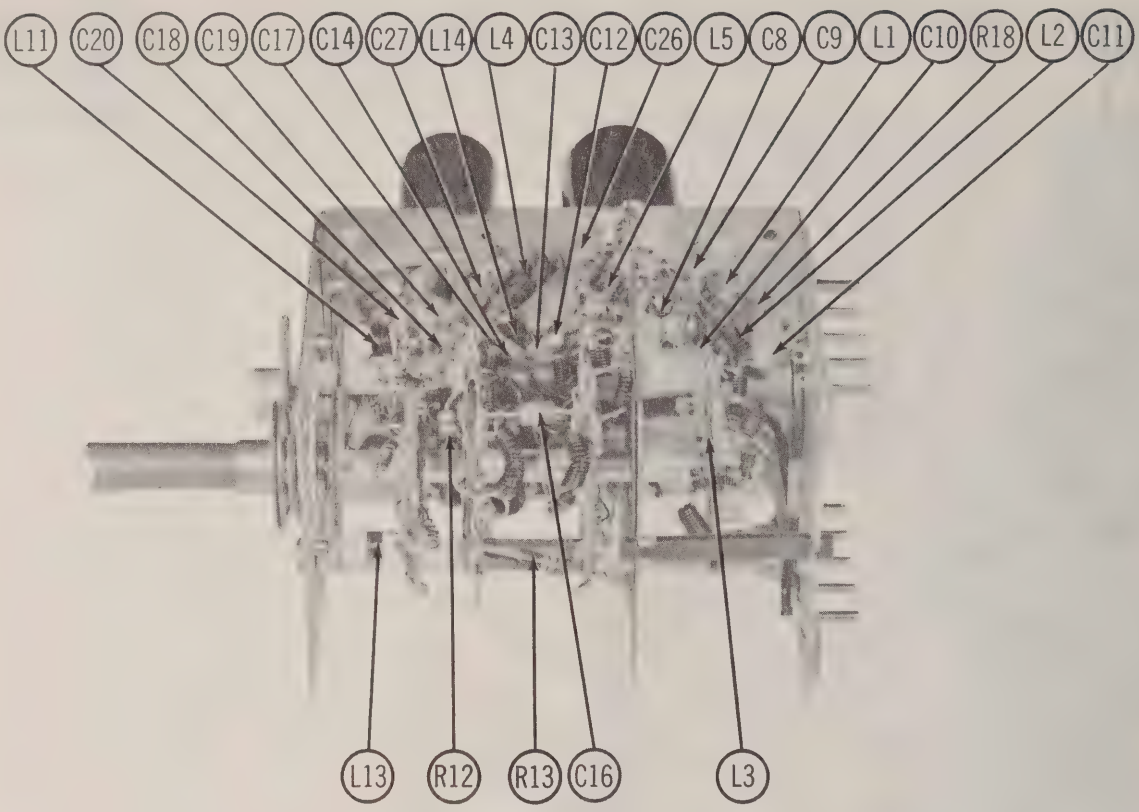
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BZ7	†3.9KΩ	440KΩ	INF	.1Ω	0Ω	INF	170KΩ	0Ω	0Ω
V 2	6J6	†10.7KΩ	†5.2KΩ	0Ω	.1Ω	220KΩ	15KΩ	0Ω		
V 3	6CB6	92KΩ	47Ω	0Ω	.1Ω	†3.5KΩ	†2.5KΩ	0Ω		
V 4	6CB6	87KΩ	47Ω	0Ω	.1Ω	†2.5KΩ	†2.5KΩ	0Ω		
V 5	6CB6	87KΩ	47Ω	.1Ω	0Ω	†2.5KΩ	†2.5KΩ	0Ω		
V 6	6CB6	.5Ω	180Ω	.1Ω	0Ω	†2.5KΩ	†2.5KΩ	0Ω		
V 7	6CL6	0Ω	3.9KΩ	†18KΩ	0Ω	.1Ω	†7.3KΩ	0Ω	†18KΩ	3.9KΩ
V 8	6AU6	†21KΩ	†2.6KΩ	0Ω	.1Ω	260KΩ	†12KΩ	†2.6KΩ		
V 9	6AU6	5Ω	0Ω	0Ω	.1Ω	†2.5KΩ	†2.5KΩ	68Ω		
V 10	6BN6	250Ω	3Ω	0Ω	.1Ω	†8.3KΩ	5Ω	†380KΩ		
V 11	6BK6	†2.5KΩ	INF	250KΩ	0Ω	.1Ω	180Ω	250KΩ	†2KΩ	INF
V 12	6BE6	50KΩ	0Ω	.1Ω	0Ω	37KΩ	†40KΩ	1.5Meg		
V 13	6SN7GT	1.8Meg	▲2.9Meg	0Ω	37KΩ	†3.5KΩ	5.8KΩ	.1Ω	0Ω	
V 14	6AH4GT	2.2Meg	0Ω	INF	INF	†1.4KΩ	INF	.1Ω	1.3KΩ	
V 15	6AL5	4.8Meg	4.8Meg	.1Ω	0Ω	22KΩ	0Ω	22KΩ		
V 16	6SN7GT	110KΩ	†120KΩ	1.2KΩ	5.7Meg	†8.3KΩ	1.2KΩ	0Ω	.1Ω	
V 17	6BQ6GT	INF	0Ω	INF	†17KΩ	470KΩ	INF	.1Ω	220Ω	TOP CAP ▲28Ω
V 18	6AX4GT	INF	INF	INF	INF	†118Ω	INF	.1Ω	0Ω	
V 19	1B3GT		PINS	1 - 8	HAVE	INF	RESISTANCE			TOP CAP ▲414Ω
V 20	5U4G	†10Ω	40KΩ	†105Ω	1Ω	INF	11.5Ω	INF	40KΩ	
V 21	5U4G	INF	40KΩ	INF	1Ω	INF	11.5Ω	INF	40KΩ	
V 22	21ZP4	0Ω	12KΩ	PIN 10 ▲470KΩ	PIN 11 †200KΩ	PIN 12 .1Ω				

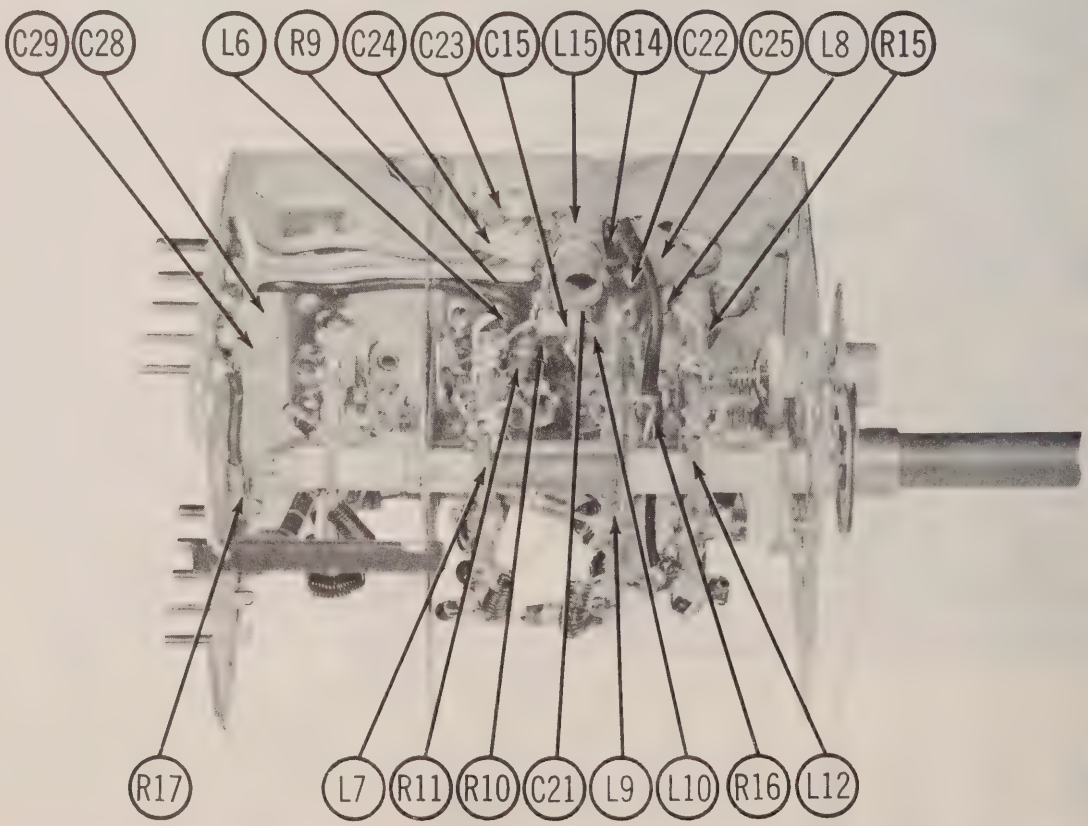
† MEASURED FROM PIN 2 OF V20
▲ MEASURED FROM PIN 3 OF V18



TUBE PLACEMENT CHART



RF TUNER-RIGHT SIDE



RF TUNER-LEFT SIDE

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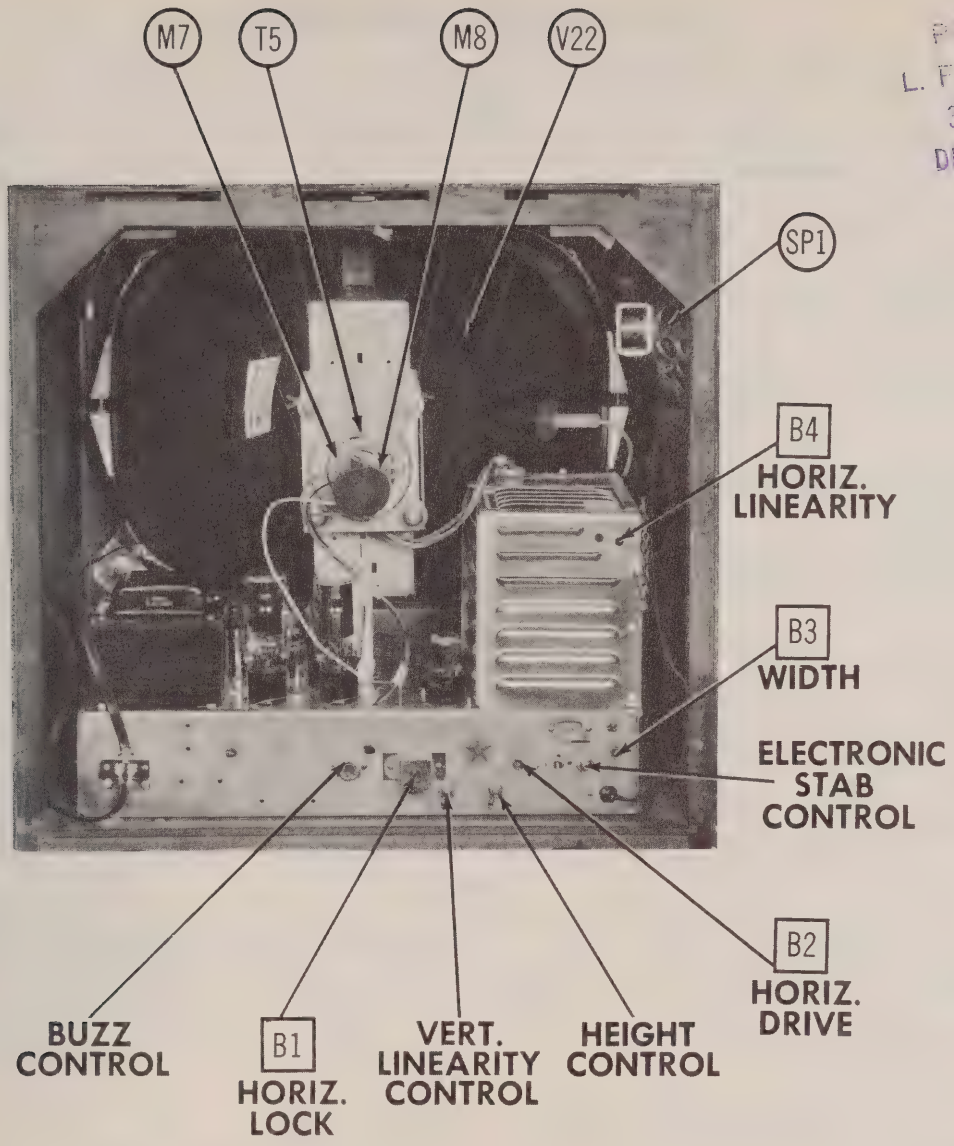

CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.

Turn the horizontal hold control fully counter clockwise.

Adjust the horizontal lock slug (B1) until 3 or 4 diagonal bars appear on screen.

Turn horizontal hold control clockwise until picture syncs. Momentairly switch off channel and back again.

If picture does not fall in sync, slightly retouch B1. Adjust the horizontal drive trimmer (B2) counter clockwise as far as possible without the presence of vertical white lines or compression near the center picture.

Adjust the width slug (B3) for a picture slightly wider than necessary to fill the picture mask horizontally.

Adjust the horizontal linearity slug (B4) for a picture that is symmetrical from left to right.

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V16, V17, V18, V20 and V21. Check B2, B3 and B4. Check waveform W16.

If Satisfactory	If Unsatisfactory
Check T3, T5A, T6, C86, C87, C6, R97 and other associated components.	Check R95, R94, R93, C84, C82 and other associated components.

DRIVE LINES

Check by substitution V17, V18 and V19. Check B2 and B4. Check T3, T5A, C82, C83, R94 and other associated circuit components.

COMPRESSED LEFT SIDE

Check adjustments of B2, B3 and B4. Substitute V17 and V18. Check components associated with the horizontal output and damper stages especially T3 and T5A.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check V16, V17 and V18 for internal arcing. Check C79 for open. Check T3 and T5A for internal arcing between windings.

XMAS TREE EFFECT

Check by substitution V16, V17 and V18. Check L33, C82, C81, C80 and other associated components.

VERTICAL

LOSS OF SWEEP

Check by substitution V13 and V14. Check waveform W10.

If Satisfactory	If Unsatisfactory
Check T4, T5B, C73, C90, R6, R80 and other associated components.	Check C72, C70, C69, R7, R76, T2 and other associated components.

INSUFFICIENT SWEEP

Check adjustment of height and vertical linearity controls. Proceed as outlined under "Loss of Sweep".

COMPRESSED AT BOTTOM

Check by substitution V13 and V14. Check T4, T5B, R7, R76, R77 and other associated circuit components.

COMPRESSED AT TOP

Substitute V13 and V14. Check C2D, R6, R80, R79, C70 and other associated components.

FOLDS

Check by substitution V13 and V14. Check associated components, especially T4 and T5B for failure or change of value.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Check by substitution V12 and V13. Check C65, C66, R62, R67, R72, R71 and other associated components.

LOSS OF VERTICAL SYNC-HORIZONTAL SYNC SATISFACTORY

Substitute V13. Check waveform W8.

If Satisfactory	If Unsatisfactory
Check T2, R76, R75, R74, R74 and other associated components.	Check vertical integrator network and other associated components.

LOSS OF HORIZONTAL SYNC-VERTICAL SYNC SATISFACTORY

Check by substitution V15 and V16. Check waveform W14.

If Satisfactory	If Unsatisfactory
Check components associated with V15 and V16 especially C82, R92, R3 and R90.	Check L33, C76, C75, C77 and R91 and other associated components.

HORIZONTAL BENDING

Check by substitution V12, V13, V15 and V16. Check horizontal AFC filter network for component failure or change of value.

VIDEO

LOSS OF VIDEO

Substitute V7. Check components associated with V7. Check picture tube.

SOUND BARS (4.5MC BEAT)

Adjust tuner fine tuning for best picture and sound. Check A11 and A15. Check video IF alignment.

POOR CONTRAST

Substitute V7. Check video detector crystal and assembly. Check picture tube and other associated components.

NEGATIVE PICTURE

Substitute V7. Check AGC network. Check picture tube and other associated components.

SMEAR

Substitute V7. Check L22, L23, L25, L26, L27 and L28. Check AGC network. Check picture tube and other associated circuit components.

WIDE BLACK BAR ACROSS PICTURE

Check by substitution V1, V3, V4, V5, V6 and V7 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V9, V10 and V11. Check stages V11 using audio signal generator. Apply audio signal across R1B.

If Satisfactory	If Unsatisfactory
Check L30, L32, R59, R58, R57, R55, L29 and other associated components.	Check T8, C61, C3D, R61, C64, speaker and other associated circuit components.

BUZZ

Adjust tuner fine tuning for best picture and sound. Adjust R5 for minimum buzz. If unsatisfactory adjust A13 and A14. Substitute V10 and realign audio IF and detector stages.

DISTROTED

Follow procedure outlined under "Weak or No Sound".

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

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ITEM No.	USE	REPLACEMENT DATA: ARVIN PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	RF Amplifier	6BZ7	6BZ7	9AJ	
V2	Converter	6J6	6J6	7BF	
V3	1st. Video IF Amp.	6CB6	6CB6	7CM	
V4	2nd. Video IF Amp.	6CB6	6CB6	7CM	
V5	3rd. Video IF Amp.	6CB6	6CB6	7CM	
V6	4th. Video IF Amp.	6CB6	6CB6	7CM	
V7	Video Output	6CL6	6CL6	6CL6	
V8	AGC Keying	6AU6	6AU6	7BK	
V9	Sound IF Amp.	6AU6	6AU6	7BK	
V10	Audio Detector	6BN6	6BN6	7DF	
V11	Audio Output	6BK5	6BK5	9BQ	
V12	Sync Separator	6BE6	6BE6	7CH	
V13	Sync P hase Inv. Vert. Oscillator	6SN7GTA	6SN7GTA	8BD	
V14	Vert. Output	6AH4GT	6AH4GT	8EL	
V15	Horiz. AFC	6AL5	6AL5	6BT	
V16	Horiz. Mult.	6SN7GTA	6SN7GTA	8BD	
V17	Horiz. Output	6BQ6GT	6BQ6GT	6AM	
V18	Damper	6AX4GT	6AX4GT	4CG	
V19	HV Rectifier	1B3GT	1B3GT	3C	
V20	LV Rectifier	5U4G	5U4G	5T	
V21	LV Rectifier	5U4G	5U4G	5T	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA: ARVIN PART No.	CBS-HYTRON PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.	RETMA BASE TYPE	NOTES
V22	21ZP4A	21ZP4A	21ZP4B ①	21ZP4A 21ZP4B ①	21ZP4A	12N 12N	① Aluminized

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: ARVIN PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C1	30	400	22422-22	AFH1-51		A047		FP145	TVL-1720	
C2A	▲30	400	22422-20	AFH4-123				FP447	R1457	
B	■60	350		PRS450/20				TC3501		
C	▲20	350								
D	100	50								
C3A	▲50	400	22422-21	AFH4-103				FP431.4	TVL-4707	
B	■60	350						TC78	TVA-1712	
C	▲40	350								
D	20	25								
C4	10	350	41429	PRS350/10		BR1235		TC62	TVA-1604	
C5	5	250	40002	PRS250/4		BR425		TC50X	TVA-1501	
C6	4	150	25453	PRS150/4		BR415		TC40	TVA-1402	
C7	2	150	41534	PRS150/4		BR415		TC40	TVA-1402	
C8	4			SI4NP0	TCZ-4		NP0K-040			
C9	1.6									
C10	7.5									
C11	800			BPD-0008	DD-801	K069	801-001	DC-521	5HK-D1	
C12	470									
C13	100			SI100	D6-101	TP34	GP1K-101	UC-531	5GA-T1	
C14	.33									
C15	.56									
C16	1.2									
C17	470									
C18	.39									
C19	10			SI10N750	TCN-10	TN-01	N750K-100	NT-541	5TCU-Q1	
C20	1.5									
C21	62									
C22	15			SI15NP0	TCZ-15	TZ-11	NP0K-150	ZT-5415	5TCC-Q15	
C23	22									
C24	150									
C25	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C26	800			BPD-0008	DD-801	K069	801-001	DC-521	5HK-D1	
C27	800			BPD-0008	DD-801	K069	801-001	DC-521	5HK-D1	
C28	800			BPD-0008	DD-801	K069	801-001	DC-521	5HK-D1	
C29	800			BPD-0008	DD-801	K069	801-001	DC-521	5HK-D1	
C30	1000			BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C31	4700		40053-472	BPD-0047	DD-502	K079	811-0047	DC-525	5HK-D47	
C32	1000		23078	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C33	3.3			SI3.3NP0	TCZ-3.3	Z008	NP0K-3R3	ZT-5533	5TCCB-V33	Note 1
C34	560		41052-1	SI560	D6-561	G063	GP2K-561	UC-5356	5GA-T56	
C35	1000		23078	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C36	2.7		41077-1							
C37	1000		23078	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C38	560		41052-1	SI560	D6-561	G063	GP2K-561	UC-5356	5GA-T56	
C39	1000		23078	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C40	1000		23078	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C41	560		41052-1	SI560	D6-561	G063	GP2K-561	UC-5356	5GA-T56	
C42	1000		23078	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C43	560		41052-1	SI560	D6-561	G063	GP2K-561	UC-5356	5GA-T56	
C44	1000		23078	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C45	1000		23078	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C46	1000		23078	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C47	1000		23078	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C48	47			SI47NP0	TCZ-47	Z033	NP0K-470	ZT-5447	5TCC-Q47	
C49	39	500	20290-390	1469-00004		22R5Q39		MCB223	MS-44	
C50	.1	200	25455-104	P288-1	DF-104	CUB2P1		PT401	2TM-P1	
C51	.05	200	25455-473	P288-05	DF-503	CUB2S5		PT415	2TM-S5	
C52	1000		23078	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C53	4700		40054-472	BPD-0047	DD-502	K079	811-0047	DC-525	5HK-D47	
C54	.22	200	25455-224	P288-22		CUB2P22		PT4022	2TM-P22	
C55	10000		40053-103	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C56	10000		40053-103	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C57	10000		40053-103	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C58	10000		40053-103	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C59	4700		40054-472	BPD-0047	DD-502	K079	811-0047	DC-525	5HK-D47	

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PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No	RATING CAP.	RATING VOLT	ARVIN PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C80	.22	400	23462-234	P488-22		CUB4P22		PT4022	47M-P22	
C81	10000		40053-103	BPD-01	DD-103	K062	811-01	DC-511	56K-81	
C82	750		40054-751	SP750	D5-751	G068	GP2K-751	UC-5S75	5GA-T75	
C83	4700		40054-472	BPD-0047	DD-502	K079	811-0047	DC-535	56K-D47	
C84	4700	1000		HVD15-0047		CUB15D47	1R5KV-472	PT15247	10HK-D47	Note 2
C85	.01	200	25455-103	P488-01	D6-103	CUB4P1	GP2-333-103	PT401	47M-S1	
C86	1	200	25455-104	P288-1	DF-104	CUB2P1		PT401	27M-P1	
C87	.47	200	25455-474	P288-47		CUB2P47		PT7047	27M-P47	
C88A	.008		✱24166	✱PA-110	✱PC-100	✱15TM1	✱405-01	PT625	✱V-1	
B	.005							PT625		
C	.005							PT625		
C89	.0047	600	20834-472	P688-0047	D6-472	CUB6D47	GP3-333-472	PT6247	67M-D47	
C90	.047	600	25461-473	P688-047	DF-503	CUB6S47		PT6147	67M-S47	
C91	.022	200	25455-223	P488-022	DF-303	CUB4S22	417-01	PT4123	47M-S22	
C92	.1	600	25461-104	P588-1	DF-104	CUB6P1		PT601	67M-P1	
C93	.047	200	25455-473	P488-047	DF-503	CUB4S47		PT4147	47M-S47	
C94	.1	600	25461-104	P688-1	DF-104	CUB6P1		PT601	67M-P1	Note 1
C95	1000		40064-102	BPD-001	DD-102	K069	801-001	DC-581	56K-D1	
C96	1000		40064-103	BPD-001	DD-103	K069	801-001	DC-581	56K-D1	
C97	.01	200	25455-103	P488-01	D6-103	CUB4S1	GP3-333-103	PT411	47M-S1	
C98	4700		40054-472	BPD-0047	DD-502	K079	811-0047	DC-535	56K-D47	
C99	.047	200	25455-473	P288-047	DF-503	CUB2S47		PT7147	27M-S47	
C80	100	500	20290-101	1469-0001		2ER5T1		MCB335	MB-31	
C81	3900	500	20432-392	1464-004		2ER5T3		MCE483	MB-34	
C82	330	500	20331-331	1469-00035		SR5T33				
C83	330	500	20290-331	1469-00035		SR5T33				
C84	270	500	20290-271	1469-0003		SR5T27		MCB341	MB-33	
C85	.1	400	25462-104	P488-1	DF-104	CUB4P1		PT401	47M-P1	
C86	.047	600	25461-473	P688-047		CUB6S47		PT6147	67M-S47	
C87	.047	600	20457-473	P688-047		CUB6S47		PT6147	67M-S47	
C88	1000	1000	40108-102	HVD15-001		ID15D1	1R5KV-102	MCK210	10GA-D1	
C89	130	5000	40038							
C90	.22	400	25462-224	P488-22		CUB4P22		PT4022	47M-P22	
C91	.22	600	25461-224	684-35		CUB6P22		PT6022	67M-P22	
C92	.22	600	25461-224	684-35		CUB6P22		PT6022	67M-P22	
C93	56	2000								
C94	.1	400	25462-104	P488-1	DF-104	CUB4P1		PT401	47M-P1	
C95	10000	1500	41135-103							
C96	10000	1500	41135-103							
C97	1000	3000	23078	BPD-001	DD-102	K069	801-001	DC-531	56K-D1	Note 3
C98	1	400	25462-104	P488-1	DF-104	CUB4P1		PT401	47M-P1	Note 3

Note 1. Some models may use 3.9MMF or 6.8MMF in this application.
Note 2. Some models may use 3900MMF in this application (part #42327-1).
Note 3. Used on Ch. TE363 only.
✱ Items C88A, C88B, C88C, R73A, R73B, R73C are combined in one unit.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	ARVIN PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	100KΩ	½	E22464-50	* QJ-507	RTV-442		UF15L	Brightness-Pancl
B	1 Meg	½					UR16-T25 †	Volume tapped at 150KΩ-Rear
C	Switch	½					UR-26 †	Attach to R1A
R2A	2 Meg	½	E22464-58	QU-159	A47-2 Meg-A	AB-75	U-56	Vert. Hold
B	Shaft		Not Req.	Not Req.	KSS-3	Not Req.	Not Req.	Attach to R2A
R3A	40KΩ	½	E22464-53	QU-123	A47-40K-S	AB-31	U-35	Horiz. Hold
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R3A
R4	15KΩ	1	E22464-52	QU-UF5XX			QU-UF5XX	Contrast tapped @ 6KΩ & 11KΩ
R5	500Ω	1	41038		39-500			Buzz- wire wound
R6A	3000Ω	1	E22464-41	QU-112	A47-3000-S	AB-8	U-8	Vert. Linearity
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R6A
R7A	2.5 Meg	½	E22464-42	QU-129	A47-2.5Meg-S	AB-83	SU-365	Height
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R7A
R8A	7.5 Meg	1	E22464-57	QU-142	A47-7.5Meg-S	AB-89	U-83	Electronic stabilizer
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R8A

* CONCENTRIKIT EQUIVALENT KIT A-2 BASE ELEMENTS & SHAFTS B11-128 & P1-304 (Pasn) B13-137X & R1-220 (Rear) & SWITCH 76-L.
† Universal replacement (Mallory exact duplicate Part No. U613258)

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA ARVIN PART No.	REPLACEMENT DATA IRC PART No.	NOTES
R3	1 Meg 5%	½		BTS-1 Meg 5%	
R10	750KΩ 5%	½		BTS-750K 5%	
R11	470Ω	½		BTS-470	
R12	10KΩ	½		BTS-10K	
R13	220KΩ	½		BTS-220K	
R14	2700Ω	½		BTS-2700	
R15	15KΩ	½		BTS-15K	
R16	8200Ω	½		BTS-8200	
R17	33000Ω	½		BTS-33000	
R18	4700Ω	½		BTS-4700	
R19	10000Ω	½	22381-103	BTS-10000	
R20	4700Ω	½	22381-472	BTS-4700	
R21	10000Ω	½	22381-103	BTS-10000	
R22	470 5%	½	22382-470	BTS-47 5%	
R23	1000Ω	½	22381-102	BTS-1000	
R24	1000Ω	½	22381-102	BTS-1000	
R25	1000Ω	½	22381-102	BTS-1000	
R26	1000Ω	½	22381-102	BTS-1000	
R27	470 5%	½	22382-470	BTS-47 5%	
R28	1000Ω	½	22381-102	BTS-1000	
R29	68000Ω 5%	½	22382-683	BTS-6800 5%	
R30	470 5%	½	22382-470	BTS-47 5%	
R31	1000Ω	½	22381-102	BTS-1000	
R32	18KΩ	½	22381-183	BTS-18K	
R33	180Ω	½	22381-181	BTS-180	
R34	1000Ω	½	22381-102	BTS-1000	
R35	12000 5%	½	22382-123	BTS-1200 5%	
R36	2700Ω 5%	½	22382-272	BTS-2700 5%	
R37	40000Ω 5%	1	41075-402		
R38	2300Ω	½	22381-232	BTS-2300	
R39	15KΩ	½	22381-153	BTS-15K	
R40	150KΩ	½	22381-154	BTS-150K	

RESISTORS (cont)

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA ARVIN PART No.	REPLACEMENT DATA IRC PART No.	NOTES
R73A	22KΩ	½		BTS-22K	
B	8200Ω	½	✱24166	BTS-8200	
C	8200Ω	½		BTS-8200	
R74	470KΩ	½	22381-474	BTS-470K	
R75	2.3 Meg 5%	½	22382-135	BTS-1.5Meg5%	
R76	1 Meg	½	22381-105	BTS-1 Meg	
R77	8200Ω 5%	½	22382-822	BTS-8200 5%	
R78	1200Ω 5%	½	22382-122	BTS-1200 5%	
R79	2.2 Meg 5%	½	22381-225	BTS-2.2 Meg	
R80	4700	½	20103-471	BTA-470	
R81	470KΩ	½	22381-474	BTS-470K	
R82	560Ω	½		BTS-560	
R83	560Ω	½		BTS-560	
R84	1000Ω	½	22381-102	BTS-1000	
R85	100KΩ 5%	½	22382-104	BTS-100K 5%	
R86	100KΩ 5%	½	22382-104	BTS-100K 5%	
R87	4.7 Meg	½	22381-475	BTS-4.7 Meg	
R88	1 Meg	½	22381-105	BTS-1 Meg	
R89	22KΩ	½	22382-223	BTS-22K	
R90	1200Ω	½	22381-122	BTS-1200	
R91	8200Ω	½	20070-822	BTA-8200	
R92	8200Ω 5%	½	22382-813	BTS-8K 5%	
R93	120KΩ	½	22381-124	BTS-120K	
R94	8200Ω	½	22381-822	BTS-8200	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA ARVIN PART No.	REPLACEMENT DATA IRC PART No.	NOTES
R95	470KΩ	½	22381-474	BTS-470K	
R96	47Ω	½	20061-470	BTS-47	
R97	220Ω	½	23970-16		
R98	33KΩ	2	20302-333	BTB-33K	
R99	33KΩ	2	20302-333	BTB-33K	
R100	10Ω	1	20306-100	BTS-10	
R101	3 80	1	20308-39		
R102	1000Ω	1	20070-102	BTA-1000	
R103	33000Ω	1	20070-333	BTA-3300	
R104	10KΩ 5%	2	25467-103	BTB-10K 5%	
R105	10KΩ 5%	2	25467-103	BTB-10K 5%	
R106	30KΩ 5%	1	22383-303	BTA-30K 5%	
R107	1500Ω 5%	2	25467-152	BTB-1500 5%	
R108	4000Ω	5	23970-27	1 3/4A-4000	
R109	2000Ω	5	23970-18	1 3/4A-2000	
R110	100Ω	22	20306-100	BTS-10K	
R111	10Ω	10	23970-26	1 3/4A-10	Note 2
R112	220KΩ	1	20061-224	BTS-220K	
R113	18KΩ	2		BTB-18K	Note 3
R114	15KΩ	2		BTB-15K	Note 3
R115	15KΩ	2		BTB-15K	Note 3
R116	15KΩ	2		BTB-15K	Note 3
R117	8200Ω	1		BTS-8200	Note 3
R118	22Ω	1	22381-220	BTS-22	Note 3

✱ Items R73A, R73B, R73C, C88A, C88B, C88C are combined in one unit.
Note 1. Chassis TE362 may use a 600Ω resistor in this application.
Note 2. Used only in chassis TE355.
Note 3. Used only in chassis TE362.

TRANSFORMER (POWER)

ITEM No.	RATING PRI	RATING SEC 1	RATING SEC 2	REPLACEMENT DATA ARVIN PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	RCA TYPE No.	Halldorson PART No.	Thordarson PART No.
T1	117VAC	590VCT @3.33A	5VAC @6A	E40928	P-8187	P-3055				
	SEC 3	SEC 4	SEC 5							
	6.3VAC @10.4A									

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA ARVIN PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	RCA TYPE No.	Halldorson PART No.	Thordarson PART No.
T2	Vert. Osc. Trans.	41745-1	A-8125	A-3003	A-97X	209T1 ①	B6702	24A87 ①
T3	Horiz. Output Trans.	41808	A-8137 & A-8138	HVO-9 & HVC-5 *	D-35 *	232T1 *	FB611 & RF800 *	FLY-14 & WC-20 *
T4	Vert. Output Trans.	41023-2	A-8164	A-3038	A-108X		B6702	24B83
T5	Yoke-Horiz. (38MH) Vert. (38MH)	24807		MDF-73	Y-22-1	222D1	DF605	Y-9
T6	Horiz. Linearity (1.1-11MH)	40533	WC-8 ②	MWC-6	WC-12 ②③	213R1 ①		
T7	Width (2.1-15MH)	41020	WC-8 ②	MWC-6	WC-12 ②③	213R1 ①		WC-18

① Drill one new mounting hole.
② Drill new mounting hole.
③ Connect to coded blue and red terminals.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

ORIGINAL TERMINAL CONNECTIONS	Stancor Replacement Connections	Merit Replacement Connections	Triad Replacement Connections	RCA Replacement Connections	Halldorson Replacement Connections	Thordarson Replacement Connections
9	7	9	10	9	9	9
6	4	6	9 & T	8	8	8 & 7
7	T	8	8	7	5	5
5	NC	NC	NC	NC	NC	NC
4	NC	NC	NC	NC	NC	NC
T	1	1	3	3	1	1
Connect Width Coil Across →	3 & 1	MWC-3 orange & black terms.	MWC-1 black & orange terms.	3 & 1	2 & 1	RF800 black & orange terms. 2 & 3	WC-20 black & orange terms 1 & 3
Special Notes →		④⑤	④⑤	⑤	⑤	④ ⑤	④ ⑤

④ Connect coded red and blue terminals of replacement width coil to AFC and AGC. If picture is out of phase, reverse red and blue terminals.
⑤ If too much sweep, remove C89 from circuit.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI	IMPEDANCE SEC	REPLACEMENT DATA ARVIN PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	NOTES
T8	5.4KΩ	3.2Ω	24778-5	A-8877 ①	A-3019	S-12	Z1002	26S49	

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V. C. IMP.	REPLACEMENT DATA ARVIN PART No.	JENSEN PART No	QUAM PART No	NOTES
SP1	6"	PM	3.2Ω	D23405	ST-108 Mod. P6-X	6A1	

COILS (RF-IF)

ITEM No.	USE	DC RES PRI	DC RES SEC.	REPLACEMENT DATA ARVIN PART No	MEISSNER PART No	MERIT PART No	MILLER PART No	NOTES
L1	Ant. Trans.	0Ω CT	0Ω					
L2	Ant. Coil	0Ω						Channel 3
L3	Ant. Coils	0Ω						
L4	Fil. Choke	0Ω						
L5	Neutr. Coil	0Ω						
L6	RF Coil	0Ω						Channel 13
L7	RF Coils	0Ω						
L8	Mixer Grid	0Ω						Channel 13
L9	Mixer Grid Coils	0Ω						
L10	Feedback Coil	1.5Ω						
L11	Osc. Plate Grid	0Ω CT	0Ω					Channel 13
L12	Osc. Coils	0Ω						
L13	Osc. Coil	0Ω						Channel 6
L14	Fil. Choke	0Ω						
L15	Conv. Plate	.1Ω						
L16	1st. Video IF Grid	.1Ω		41176	17-4631 †		6216 †	Includes Trap, 5000MMF Cap., & 33KΩ resistor
L17	1st. Video IF Plate	.1Ω		41171			6217	Includes trap, 4700Ω resistor & 1000MMF Cap.
L18	2nd. Video IF Grid	.1Ω		41172			6218	Includes trap
L19	Fil. Choke	0Ω		23095	19-3001	TV-189	6175	.8 Microhenry
L20	3rd. Video IF	.3Ω	.3Ω	41173	20-1045		6219	
L21	4th. Video IF	.3Ω	.3Ω	41173	17-4523		6219	
L22	5th. Video IF	.3Ω	.3Ω	41174				Includes 1N64 crystal detector, 10KΩ resistor, 36 microhenries RF Chokes and Cap.
L23	Series Peaking Coil	4.3Ω		25468-28	19-3098 *	TV-181 *	6177 *	93 Microhenries, wound on 6.8KΩ resistor
L24	Shunt Peaking Coil	1Ω		25468-15	19-3500	TV-186	6174	500 Microhenries
L25	Series Peaking Coil	6Ω		25468-19	19-3380 ✱	TV-184 ✱	6180 ✱	185 Microhenries, wound on 8.2KΩ resistor
L26	4.5MC Trap	1.5Ω		25809	20-1004	TV-151	1470	
L27	Shunt Peaking Coil	1Ω		25468-16	19-3500 ▲	TV-188 ▲	6174 ▲	500 Microhenries, wound on 10KΩ resistor
L28	Series Peaking Coil	6.5Ω		25468-20	19-4200	TV-185 ✦	6154 ✦	215 Microhenries, wound on 8.2KΩ resistor Tapped @ 4.4Ω
L29	1st. Sound IF	5.8Ω		41176	17-1025			
L30	2nd. Sound IF	5Ω	3.1Ω	41177	17-1021	TV-106 ✱	1468 ✱	185 Microhenries
L31	RF Choke	6Ω		25468-1	19-3180	TV-184	6180	
L32	Quadrature Coil	6.8Ω		40937			1470-A ✦	
L33	Horiz. Osc.	65Ω		23449	19-1576	TV-163	6210	
L34	RF Choke	4Ω		25468-10	19-3093	TV-181	6177	93 Microhenries

† Use secondary and trap windings only, add .005MMF capacitor externally.
* Parallel with 6.8KΩ resistor.
✱ Parallel with 8.2KΩ resistor.
▲ Parallel with 10KΩ resistor.
✦ Parallel with 8.2KΩ resistor.
① Drill one new mounting hole.
† Use adaptor plate.

FILTER CHOKE

ITEM No	RATINGS TOTAL DIRECT CURRENT	RATINGS D.C. RESISTANCE	RATINGS INDUCTANCE @ CURRENT 1000 ~	REPLACEMENT DATA ARVIN PART No	Stancor PART No	Merit PART No	Triad PART No	Halldorson PART No	Thordarson PART No
L35	.330ADC	94Ω	1.7 Hy.	40925-1	C-2334 ①				C-5037

① Drill one new mounting hole.

FUSES

ITEM No	TYPE	RATING	REPLACEMENT DATA ARVIN PART No FUSE	ARVIN HOLDER	LITTELFUSE PART No FUSE	LITTELFUSE HOLDER	BUSS PART No FUSE	BUSS HOLDER
M1	3AG P/T ⅜	1/4A 250V	40663		315.250 (3AG ⅜ P/T 1/4A)		MDV 1/4	

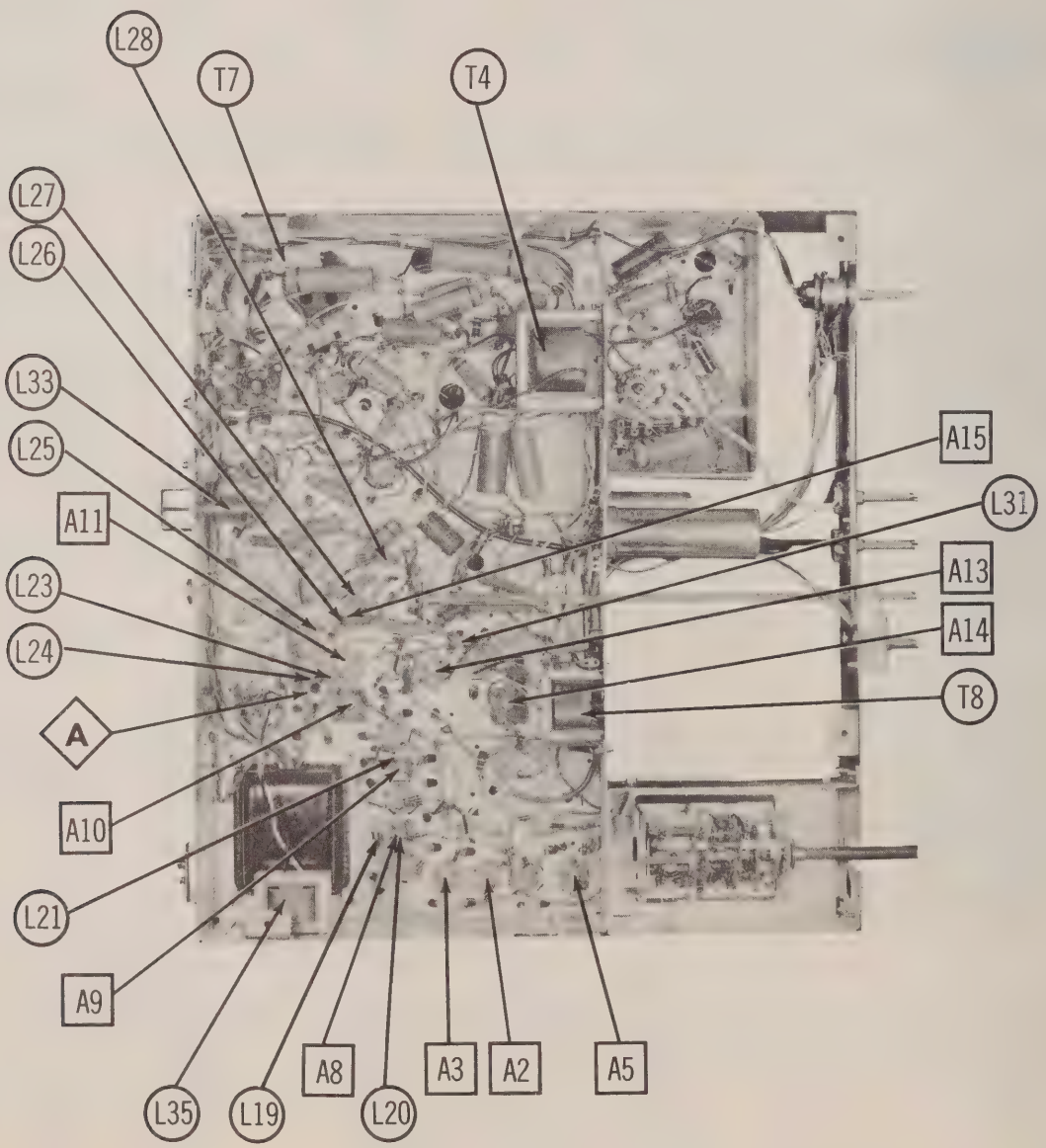
PARTS LIST AND DESCRIPTIONS (Continued)

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		ARVIN PART No.	SYLVANIA PART No.	FEDERAL PART No.	
M2	1N64		1N132, 1N60	1N64A	Video Detector

MISCELLANEOUS

ITEM No.	PART NAME	ARVIN PART No.	NOTES
M3A	Tuner	41880-1	VHF only (TE-355 chassis)
B	Tuner	41737	VHF used on UHF models(TE-362 chassis)
M4	Tuner	41766-1	UHF (TE-362 chassis only)
M5	Trap	40915	41MC antenna filter
M6	Switch	41039	Local-Distance (AGC)
M7	Focus Magnet	40991-2	Includes centering device
M8	Ion Trap	25662-2	
M9	Dial Light	19351	Bayonet, #47, Used in Ch. TE362 only
B2	Trimmer Cap.	24528	Horiz. Drive (40-370MMF)
	Knob	41049-1	VHF Channel Selector (TE-355 chassis)
	Knob	41049-1	Off/on/volume
	Knob	40948	Fine tuning
	Knob	40932	Brightness
	Knob	24699-7	Behind control door
	Knob	41760-1	Channel Selector - VHF (TE-362 chassis)
	Disk	41713	UHF Indicator (TE-362 chassis only)
	Safety Glass	41646	



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR & ALIGN. IDENTIFICATION

TROUBLE SHOOTING AIDS (cont)

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

POWER

DEAD SET

If filament fail to light, check AC interlock assembly, switch on Volume Control and T1. If filament light, substitute V20 and V21. Check B+ filter and decoupling network components.

SMALL AND/OR DIM PICTURE

Substitute V20 add V21. Check B+ filter and decoupling network components.

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check M1 fuse. Check by substitution V16, V17, V18 and V19. Check waveform W16.

If Satisfactory	If Unsatisfactory
Check T3, T5A, T6, T7, C86, C87, C85, R98, R99, and other associated components.	Check C84, R93, R92, R3, L33, R91 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V16, V17, V18, V20 and V21. Check picture tube. Proceed as outlined under "Loss of High Voltage".

BLOOMING

Check by substitution V17, V18, V19, V20 and V21. Check R84, C93, R100 and other associated components.

GENERAL

RASTER – SOUND – NO PICTURE

Follow procedure outlined under "Loss of Video".

RASTER - PICTURE – NO SOUND

Follow procedure outlined under "Weak or No Sound".

RASTER – NO SOUND – NO PICTURE

Check by substitution V3, V4, V5, V6 and V7. Check tuner V1 and V2 and other associated components.

NO RASTER – SOUND – HIGH VOLTAGE

Check R81 for open. If open, sound and high voltage will be satisfactory. Video waveform will be present at pin 11 of V22.

NO RASTER – NO SOUND

Follow procedure outlined under "Dead Set".

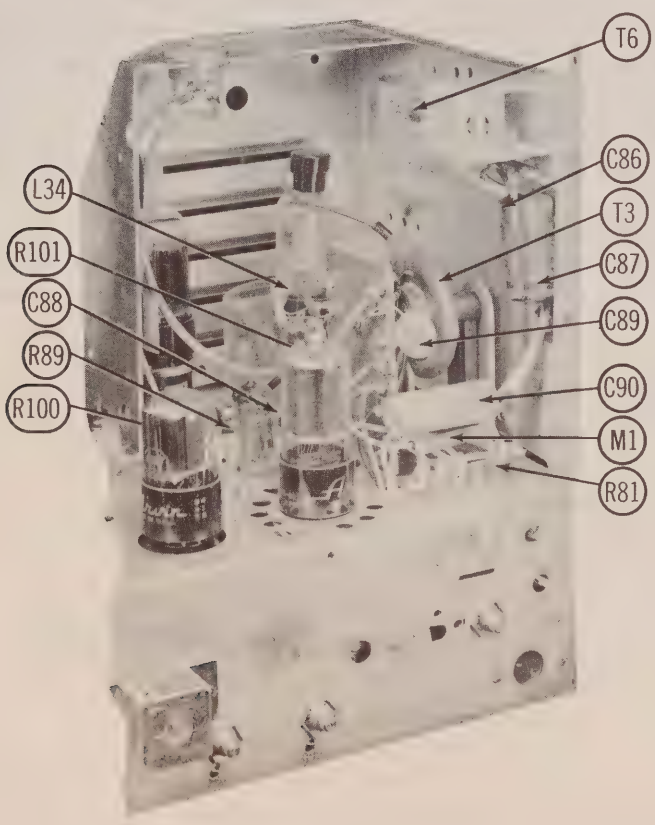
KEYSTONE EFFECT

Check T5, C93, R84, R83, R82.

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.



HIGH VOLTAGE COMPARTMENT

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removing the channel selector and fine tuning knobs.

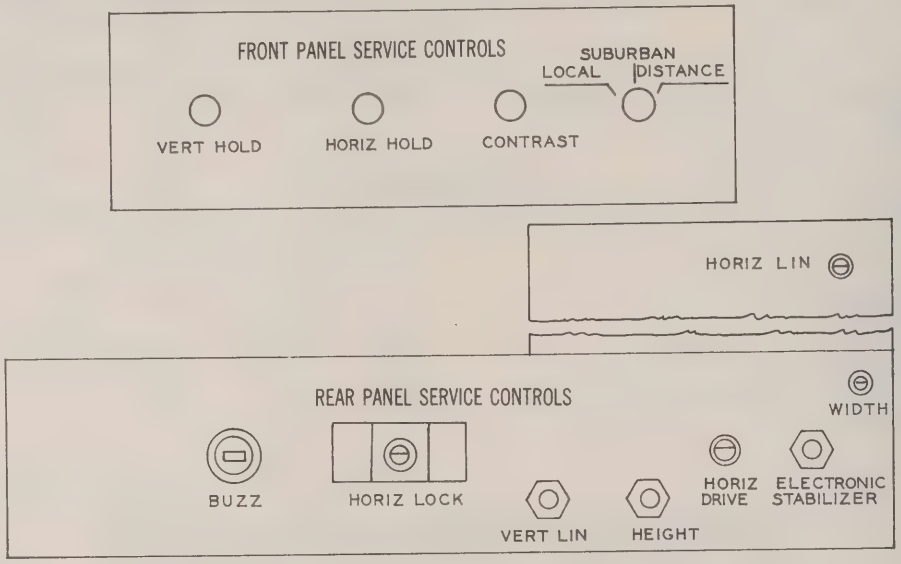
PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass, remove four (4) wood screws holding metal strip at the top of safety glass. Remove metal strip and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION



SPECIAL ADJUSTMENTS - AUTOMATIC ELECTRONIC STABILIZER CONTROL

If the picture becomes unstable due to electrical interference tune in the strongest station available and turn R8A clockwise until picture shifts or distorts. Turn R8A counter clockwise until picture becomes stable.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the horizontal oscillator circuit can be made from the rear panel of the chassis. Set the horizontal hold control at the mid-position of its range and adjust the horizontal lock slug (L33) until the picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz. Adjust the buzz control located on the rear apron of the chassis for maximum volume and minimum buzz. If results are unsatisfactory see alignment instructions on pages 6 and 7.

FUSES

One fuse is used for horizontal sweep circuit protection. (For location see tube placement chart).

CENTERING

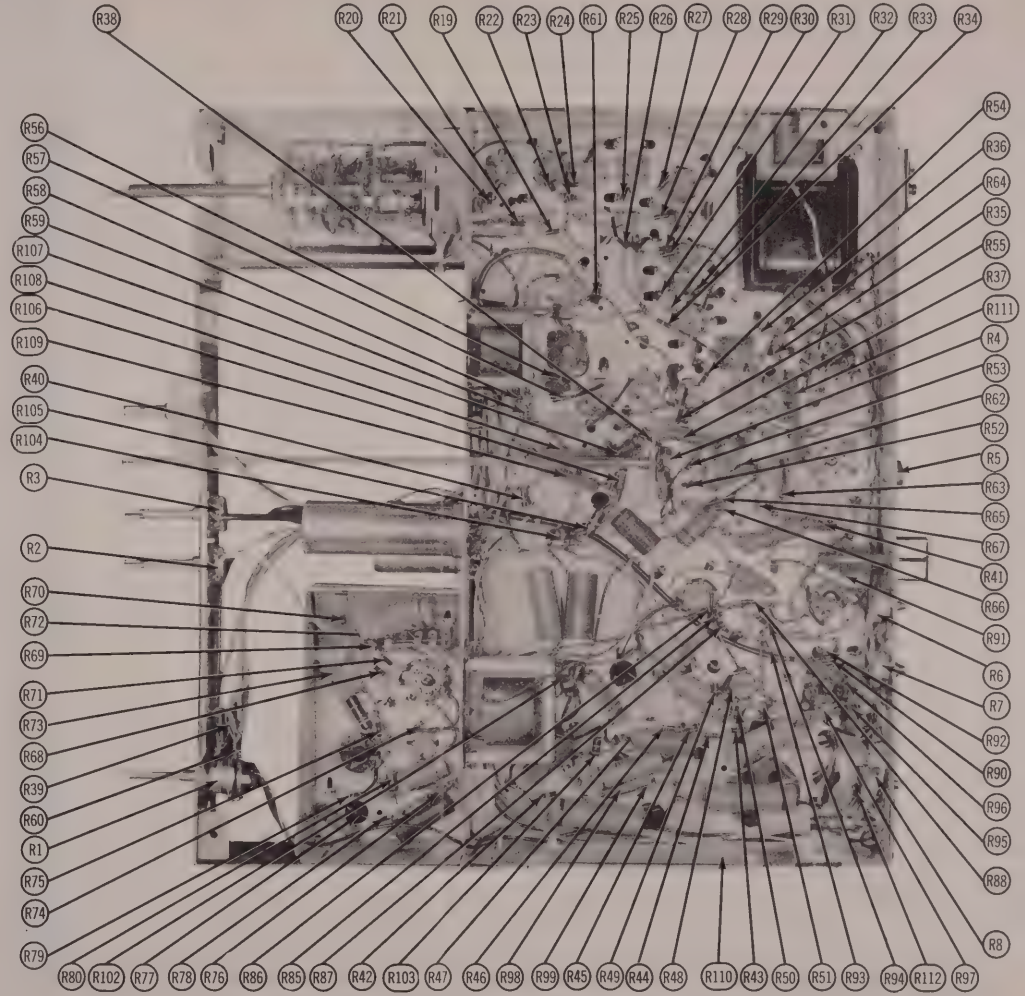
Centering is accomplished mechanically by means of a centering lever on the PM focusing assembly. Adjust the centering lever from side to side, and up and down until the picture is properly centered.

BUILT-IN ANTENNA TUNING

Built-in antenna can be adjusted from rear of the cabinet. Adjust for a picture of maximum contrast and minimum ghosts.

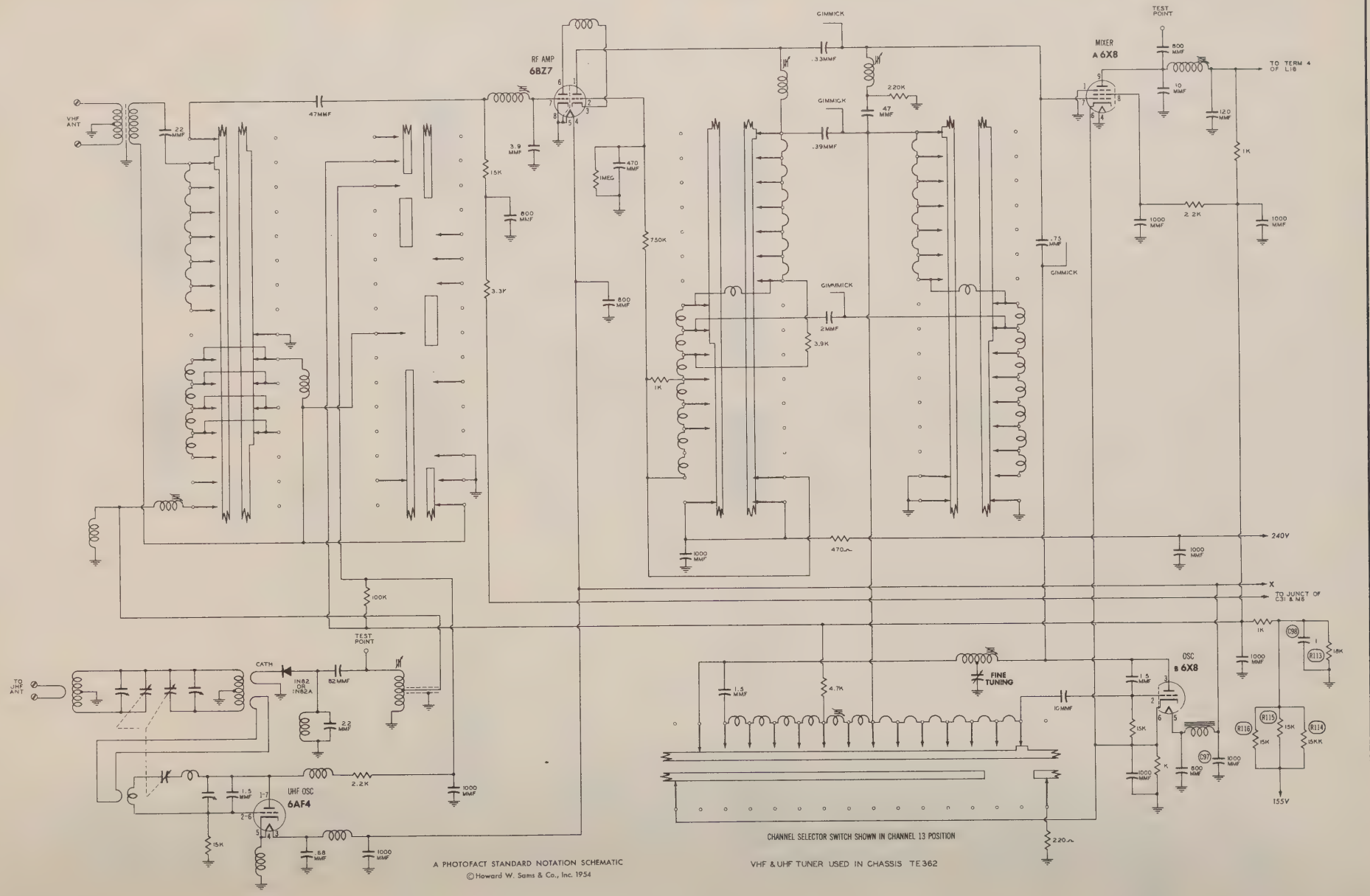
DISASSEMBLY INSTRUCTIONS

1. Remove 8 push-on type control knobs from front panel.
2. Remove 6 wood screws and 1 metal screw. Remove rear cover.
3. Disconnect built-in antenna, speaker plug, yoke plug, CRT socket and HV lead.
4. Remove 1 metal screw from chassis to yoke bracket.
5. Remove 6 chassis bolts. Remove chassis.
6. Remove 4 speaker nuts. Remove speaker.



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

PROC... L. F. ... DENVER, COLORADO



A PHOTOFACT STANDARD NOTATION SCHEMATIC

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ALTERNATE TUNER SCHEMATIC

PR
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

BUICK
MODEL 981550

BUICK
MODEL 981550

TRADE NAME	Buick Model 981550
SUPPLIER	Buick Motors, Div. of General Motors, Detroit, Mich.
TYPE SET	Battery Operated Custom Built Automobile Superheterodyne Receiver
TUBES (Seven)	Types 12BA6 RF Amp., 12BE6 Conv., 12BA6 IF Amp., 12BF6 Det.-AVC-AF Amp., (2) 12V6GT Audio Output, 0Z4 Rectifier
POWER SUPPLY	12 Volt Storage Battery — RATING 2.7 Amp. @ 12.6 Volts DC
TUNING RANGE—BROADCAST	550-1600KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Turn tone control to treble position.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 7 (grid) of 12BE6 (V2). Low side to chassis.	262KC (400~Mod)	High frequency end stop	Across voice coil	A1, A2 A3, A4	Adjust for maximum output.
2.	75MMF	High side thru 75MMF to antenna receptacle Low side to chassis.	1615KC	"	"	A5, A6, A7	Check mechanical setting of A8. The rear of core should be 1 25/32" from mounting end of coil form. If necessary, make this adjustment and re-seal core. Adjust A5, A6 and A7 for maximum output.
3.	"	"	1000KC	Tune to 1000KC signal	"	A9, A10	Adjust for maximum output.,
4.	"	"	1615KC	High frequency end stop	"		Retouch A6 and A7 for maximum output.
5.	"	"	1000KC	Tune to 1000KC signal	"		If necessary, place the dial pointer opposite the first "0" of 100 on the dial with the pointer adjustment screw.
6.	With the radio installed in the car and the antenna fully extended tune in a weak station between 600 and 1000KC and adjust A7 for maximum volume.						

PUSH BUTTON ADJUSTMENT

Press push button to the right and pull out.
Tune manually to the desired station and press the push button all the way in.
Repeat procedure for remaining push buttons.

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		BUICK PART No.	STANDARD REPLACEMENT		
V1	RF Amplifier	12BA6	12BA6	7BK	
V2	Converter	12BE6	12BE6	7CH	
V3	IF Amplifier	12BA6	12BA6	7BK	
V4	Det.-AVC-AF Amp	12BF6	12BF6	7BT	
V5	Audio Output	12V6GT	12V6GT	7S	
V6	Audio Output	12V6GT	12V6GT	7S	
V7	Rectifier	0Z4	0Z4	4R	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

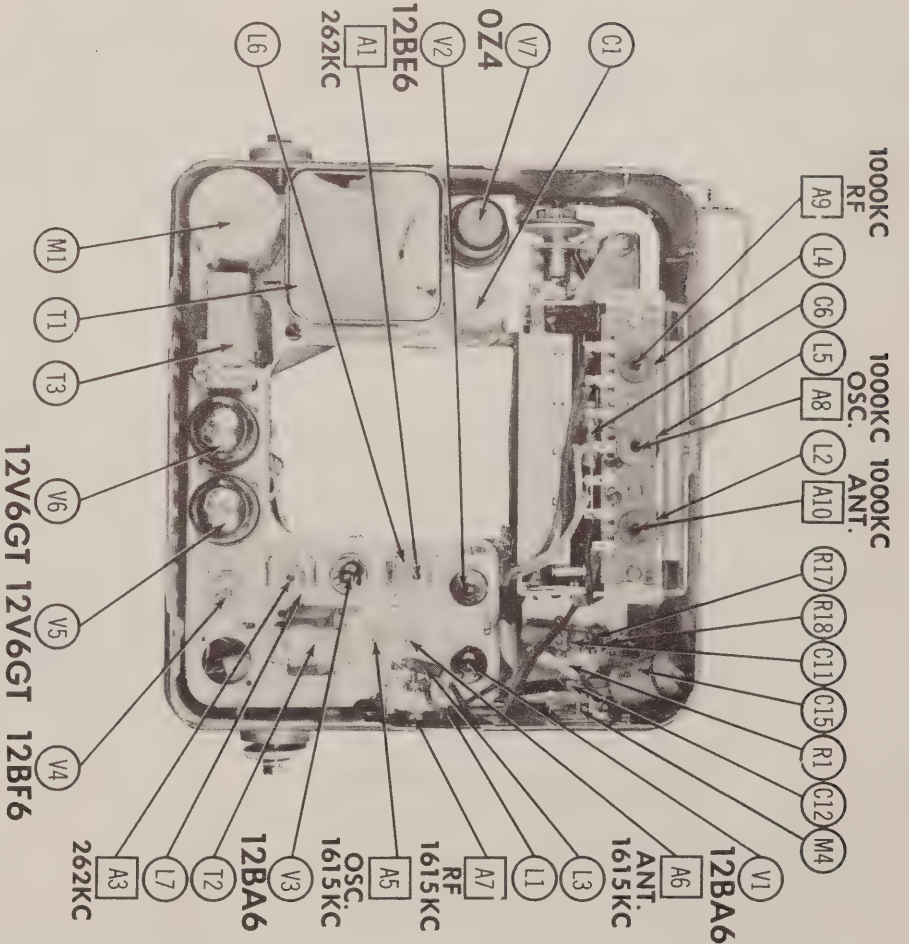
ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	BUICK PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	■20	400	M-908	AFH3-120		C099		FP345.8	TVL-3678	
B	▲20	400								
C	20	25								
C2	.05	200	6512	P288-05	DF-503	PJ2S5		PT415	2TM-S5	
C3	.1	400	6513	P488-1	DF-104	CUB4P1		PT401	4TM-P1	
C4	39	500	G-390	1468-0004		5W5T39		MCB223	MS-44	
C5	39	500	G-390	1468-0004		5W5T39		MCB223	MS-44	
C6	1800		7257424							
C7	10	500	G-100	1469-00001		5W5Q1		MCB215	MS-41	
C8	.005	600	6531	P688-005	DD-502	CUB6D5	GP2-333-502	PT625	6TM-D5	
C9	220		G-221	1468-0002		5W5T2		MCB237	MS-37	
C10	.2	400	6514	P488-2		CUB4P2		PT402	4TM-P2	
C11	.004	600	6530	P688-004	D6-402	CUB6D4	GP2-333-402	PT624	6TM-D4	
C12	180	500	G-181	1467-00015		5W5T18		MCB236	1FM-315	
C13	.025	400	1211232	P488-025		CUB4S25		PT4125	4TM-S25	
C14	.0015	800	7236134	P1088-0015		CUB16D15		PT16215	MB-D15	
C15	.5	100	6592	VHC-36		PJ2P5		RF480	HC-3	
C16	.47	100	7257906	VHC-36		PJ2P5		RF480	HC-3	
C17	.007	1600	H-702	P1688-007		CUB16D7		PT1627	MB-D7	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	BUICK PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	250KΩ		7264309					Tone-panel - Note
B	500KΩ							Volume & Switch tapped ⓐ 220KΩ -rear

Note . Ground the right hand terminal.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	BUICK PART No.	IRC PART No.	
R2	2.2Meg	1/2	A-225	BTS-2.2Meg	
R3	82Ω	1/2	1214541	BTS-82	
R4	15KΩ	1	B153	BTA-15K	
R5	330KΩ	1/2	A-334	BTS-330K	
R6	22KΩ	1/2	A-223	BTS-22K	
R7	15KΩ	2	G-153	BTB-15K	
R8	150Ω	1/2	A-151	BTS-150	
R9	1Meg	1/2	A-105	BTS-1Meg	
R10	1Meg	1/2	A-105	BTS-1Meg	
R11	1Meg	1/2	A-105	BTS-1Meg	
R12	1000Ω	1/2	A-102	BTS-1000	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	BUICK PART No.	IRC PART No.	
R13	2200Ω	1/2	A-222	BTS-2200	
R14	820KΩ	1/2	1214561	BTS-820K	
R15	47KΩ	1/2	A-473	BTS-47K	
R16	27KΩ	1	B-273	BTA-27K	
R17	47KΩ	1/2	A-473	BTS-47K	
R18	470KΩ	1/2	A-474	BTS-470K	
R19	360Ω	1	7234563	BTA-360	
R20	1800Ω	2	C-272	BTB-1800	
R21	15KΩ	1	B-153	BTA-15K	
R22	820Ω	1	B-821	BTA-820	Note 1

Note 1. Not used in all models.

TRANSFORMER (VIBRATOR)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	BUICK PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
T1	12.6V @2.7A	400VCT .058A			6066					

TRANSFORMER (DRIVER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	BUICK PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
T2	1.8KΩ CT				6061					

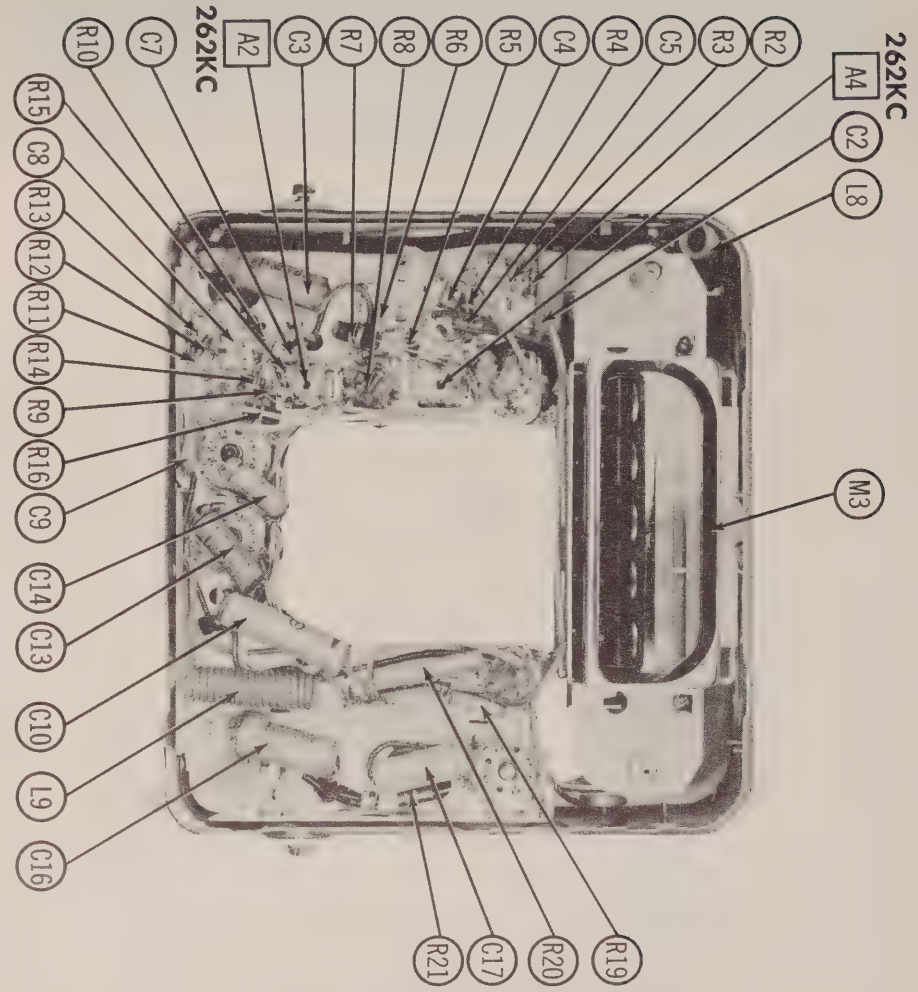
TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	BUICK PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	
T3	7.8KΩ CT	4Ω	6063	A-3852	A-2936	S-15X	Z1002	22S87	

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	BUICK PART No.	JENSEN PART No.	QUAM PART No.	
SP1	6 X 9"	PM	4Ω	7264667	ST-810 P69-V	69A2	

CHASSIS—BOTTOM VIEW



SET 248

FOLDER 3

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	BUICK PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Ant. Coupling	.7Ω			19-1004		4610	6.8 Microhenries
L2	Ant. Coil	10Ω		7258914				
L3	RF Coupling	4.2Ω		7240251	19-6022		4626	28 Microhenries
L4	RF Coil	12Ω		7258914				
L5	Osc. Coil	1.2Ω	4.5Ω	7260499				
L6	Input IF	30Ω	32Ω	1218725	16-6752	BC-350	12-H1	
L7	Output IF	31Ω	30Ω	1218726	16-6754	BC-354	12-H6	
L8	Fil. Choke	0Ω		1217846				
L9	Fil. Choke	0Ω		1217846				

VIBRATOR

ITEM No.	TYPE	INPUT VOLTS	FRE-QUENCY	REPLACEMENT DATA				NOTES
				BUICK PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	RADIART PART No.	
M1	Interrupter	12.6V	115 ∿	8550	6330	G-874	6330	

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			BUICK PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M2	7AG	7.5A 32V	455640	1220177	30307.5 (7AG-7.5A)	155009	AGW7 ½	HRH

PARTS LIST AND DESCRIPTIONS (Continued)

MISCELLANEOUS

ITEM No.	PART NAME	BUICK PART No.	NOTES
M3	Dial Light	7263675	#57 Bayonet
M4	Spark Plate	1217848	
A7	Trimmer Cap.	7264297	Antenna
A5, A6	Trimmer Cap.	7242454	Dual -RF & Osc. sections
	Knob	1163889	Control
	Knob	1163891	Dummy
	Knob	1163633	Tone
	Push button & Slide Assembly	1220312	

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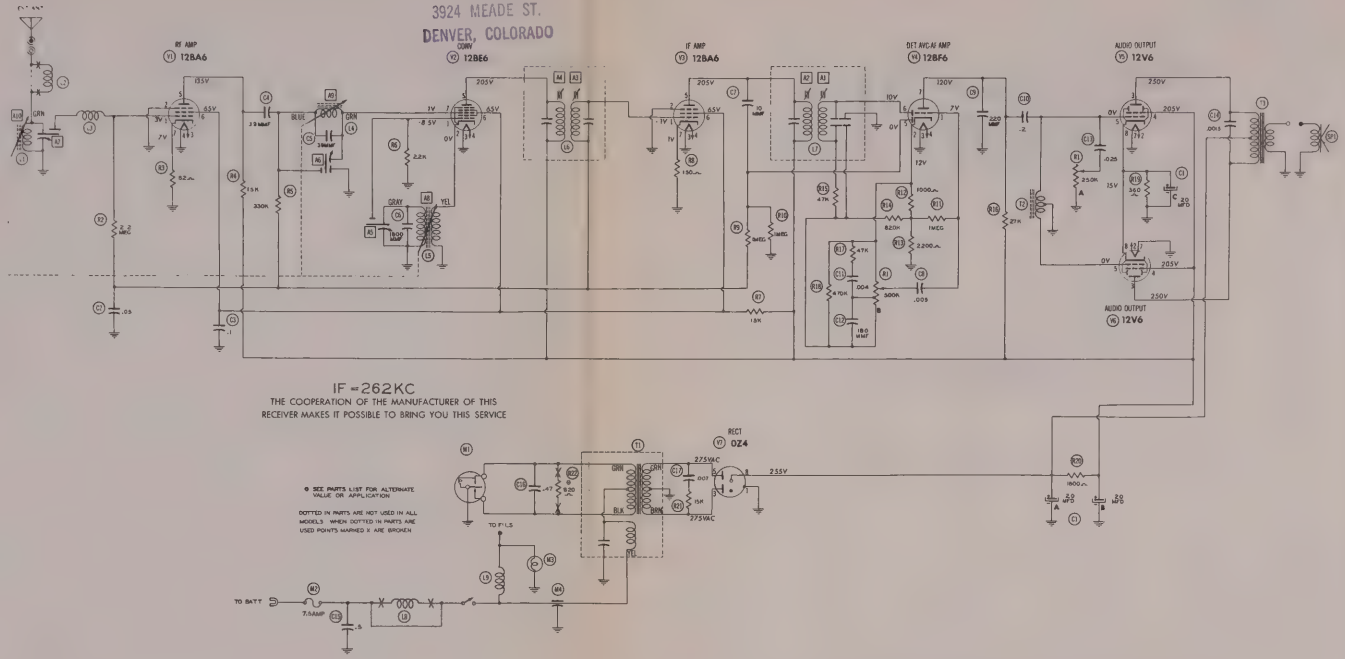
DENVER, COLORADO



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	12BA6	4.2Meg	0Ω	3Ω	0Ω	†16.8KΩ	†16.8KΩ	82Ω	
V 2	12BE6	22KΩ	1.3Ω	0Ω	3Ω	†1.8KΩ	†16.8KΩ	2.3Meg	
V 3	12BA6	2Meg	0Ω	3Ω	0Ω	†1.8KΩ	†16.8KΩ	150Ω	
V 4	12BF6	1Meg	3.5KΩ	3Ω	0Ω	1Meg	280KΩ	†29KΩ	
V 5	12V6GT	INF	3Ω	†185Ω	†1.8KΩ	1KΩ	2Meg	0Ω	360Ω
V 6	12V6GT	250KΩ	0Ω	†185Ω	†1.8KΩ	1KΩ	INF	3Ω	360Ω
V 7	0Z4	0Ω	INF	220Ω	INF	230Ω	INF	INF	1.2Meg

† MEASURED FROM PIN 8 OF V7

1. DC voltage measurements taken with vacuum tube voltmeter, AC voltages measured to 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative
4. Battery voltage maintained at 12.6 volts for voltage readings
5. Maximal tolerance on components values makes possible a variation of ± 10% in voltage and resistance readings
6. Volume control at maximum, no signal applied for voltage measurements.

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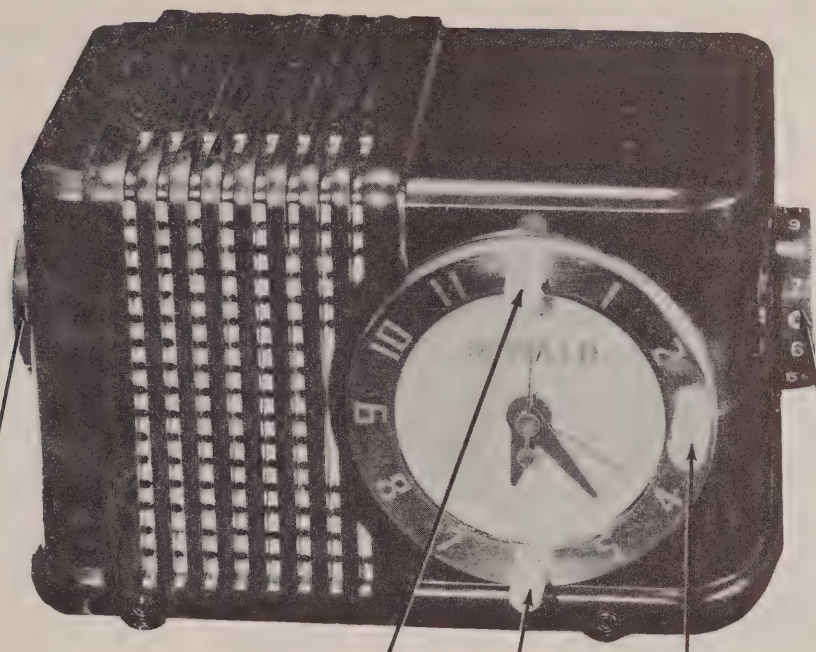
DEWALD
MODEL H-533



PROPERTY OF
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3924 MEADE ST.
DENVER, COLORADO

VOLUME CONTROL

TIME SET

TUNING CONTROL

ALARM SET

AUTO ON-OFF SWITCH

DEWALD
MODEL H-533

TRADE NAME	DeWald Model H-533
MANUFACTURER	DeWald Radio Mfg. Co., 35-15 37th. Ave., Long Island City, N.Y.
TYPE SET	AC Operated AM Superheterodyne Receiver With Electric Clock
TUBES (Five)	Types 12BE6 Conv., 12AU6 IF Amp., 12AV6 Det.-AVC-AF Amp., 50C5 Audio Output, 35W4 Rectifier
POWER SUPPLY	105-125 Volts AC-60 Cycles — RATING .25 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	530-1660KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer, turn tuning capacitor fully closed and set pointer to last reference mark at low frequency end of dial. Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-. Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.01MFD	High side to antenna stator lug on tuning gang. Low side to B-	455KC (400~Mod)	Tuning gang fully open	Across voice coil	A1, A2	Adjust for maximum output. If AC power is used without an isolation transformer, reduce dummy antenna to 200MMF to reduce hum modulation.
2.	"	"	1660KC	"	"	A3	"
3.		Loop	1400KC	Tune to 1400KC signal	"	A4	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

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PARTS LIST AND DESCRIPTIONS

DEWALD MODEL H-533

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		DEWALD PART No.	STANDARD REPLACEMENT		
V1	Converter	12BE6	12BE6	7CH	
V2	IF Amp.	12AU6	12AU6	7BK	
V3	Det.-AVC-AF Amp	12AV6	12AV6	7BT	
V4	Audio Output	50C5	50C5	7CV	
V5	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	DEWAL PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	50	150	2002-5	PRS150/50-50		BBRD5515		TCD49	TVA-2453	Red Yellow
B	50	150								
C2	.05	200		P288-05	DF-503	PJ2S5		PT415	2TM-S5	
C3	120									
C4A	220									
B	200									
C	250		♦2069	♦PA-113-1	♦PC-150	♦116TM1	♦1408-02		♦DT-2	
D										
E	5000									
C5	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C6	20000			BPD-02	DD-203	K084		DC-512	5HK-S2	
C7	.047	400		P488-047	DF-503	PJ4S47		PT4147	4TM-S47	

♦ Items C4A, C4B, C4C, C4D, C4E, R8A, R8B, R8C are combined in one unit.
When replacing items individually items C4C and C4D should total 250MMF.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	DEWALD PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	2Meg	½	3046-1	Q13-139	A47-2Meg-Z	AB-76	U-55	Volume
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R1A

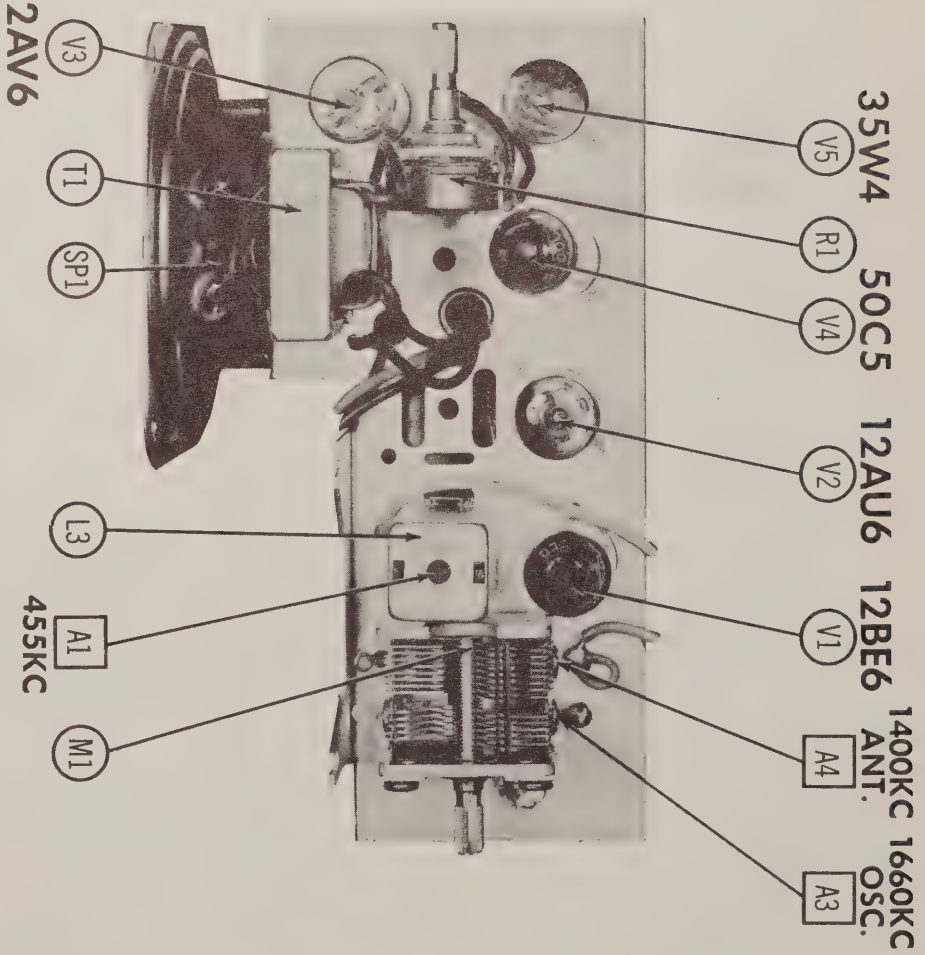
RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	DEWALD PART No.	IRC PART No.	
R2	22KΩ	½		BTS-22K	
R3	1000Ω	½		BTS-1000	Note 1
R4	2700Ω	½		BTS-2700	Note 2
R5	12KΩ	½		BTS-12K	
R6	3.3Meg	½		BTS-3.3Meg	
R7	100KΩ	½		BTS-100K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	DEWALD PART No.	IRC PART No.	
R8A	6.8Meg	½	♦2069	BTS-6.8Meg	
B	470KΩ	½		BTS-470K	
C	470KΩ	½		BTS-470K	
R9	150Ω	½		BTS-150	
R10	1500Ω	1		BTA-1500	
R11	15Ω	½		BTS-15	

Note 1. Not used in all Models.
Note 2. Some models may use a 3900Ω resistor in this application.
♦ Items R8A, R8B, R8C, C4A, C4B, C4C, C4D, C4E are combined in one unit.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	DEWALD PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	
T1	2.3KΩ	3.6Ω	7671-1	A-3332 ①	A-3025 ①	S-12X ①	Z1101 ①		① Bend mounting tabs down, file out slots, mount on original mounting bracket.

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	DEWALD PART No.	VIKING PART No.	QUAM PART No.	
SP1	3½"	PM	3.6Ω	7035-1	35J4	3A07	

COILS (RF-IF)

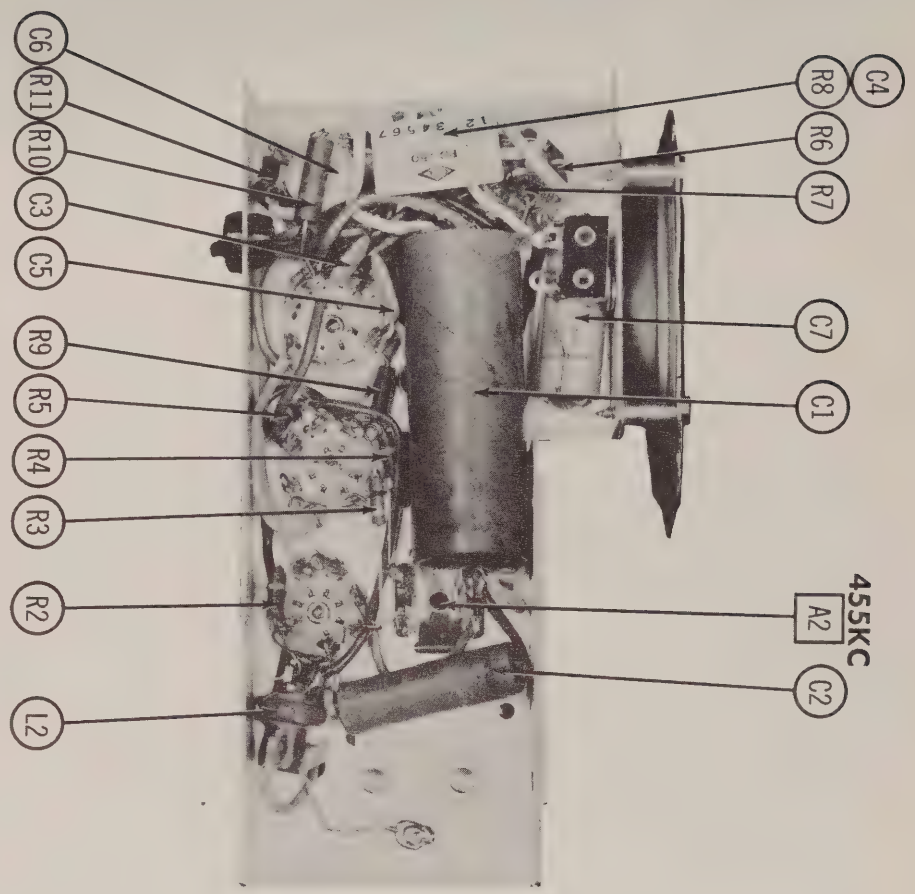
ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	DEWALD PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Ant. Coil	.9Ω		1156A			69-Osc.†	
L2	Osc. Coil	.7Ω	7.5Ω	1154A-2	14-1073		12-C2	
L3	IF Trans.	20Ω	20Ω	1091C-7	16-6758	BC-353		

† Drill mounting hole.

MISCELLANEOUS

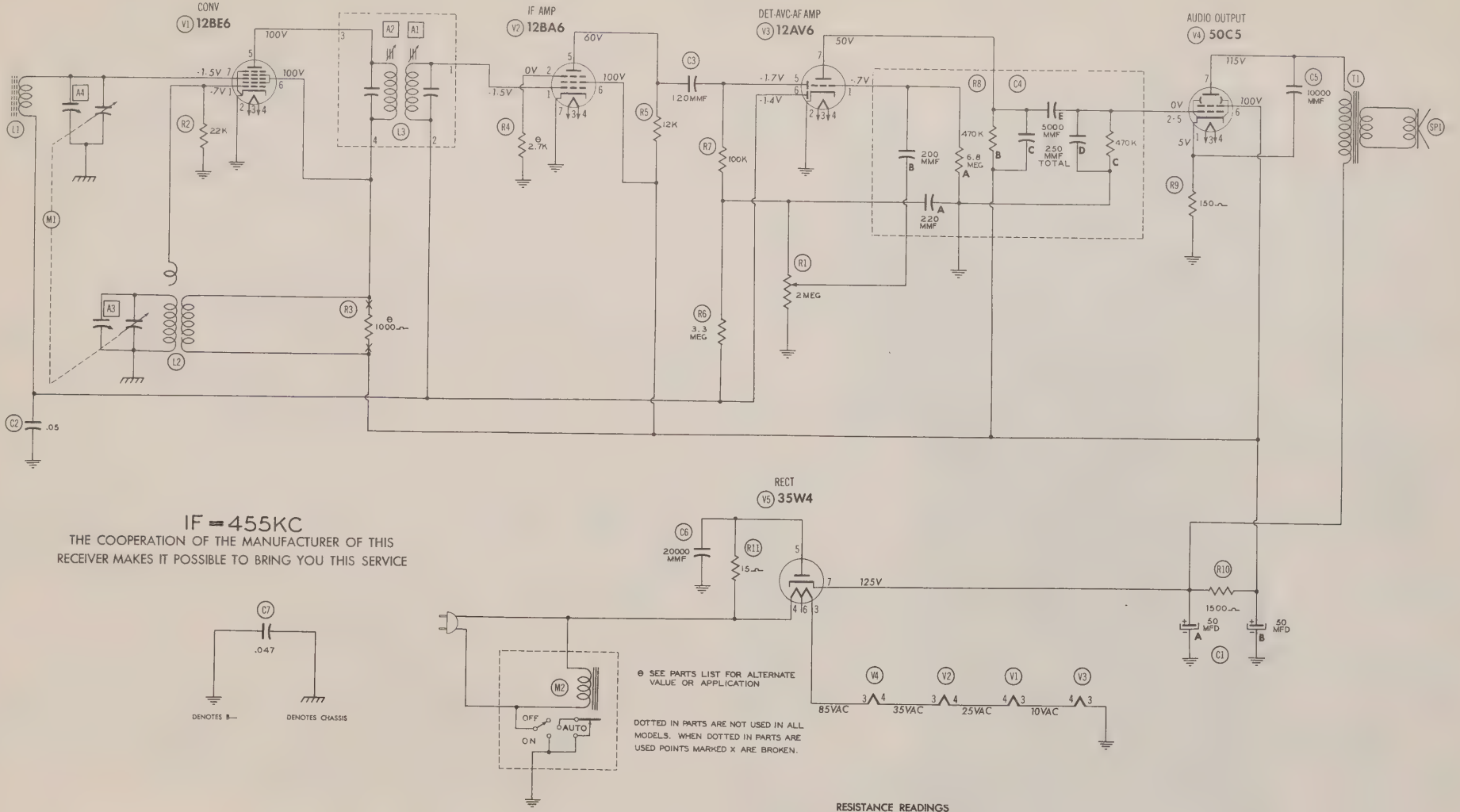
ITEM No.	PART NAME	DEWALD PART No.	NOTES
M1	Tuning Cap.	2071-A-2	(19-23MMF, 15-115MMF)
M2	Clock	8104	
	Cabinet	4226	
	Knob	4228-B	Tuning & Volume

CHASSIS—BOTTOM VIEW



PROPERTY OF
L. F. BLAIR RADIO
SERVICE WORK
DENVER, COLORADO

DEWALD
MODEL H-533



IF = 455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DOTTED IN PARTS ARE NOT USED IN ALL MODELS. WHEN DOTTED IN PARTS ARE USED POINTS MARKED X ARE BROKEN.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	22KΩ	0Ω	13Ω	25Ω	†1.5KΩ	†1.5KΩ	5.3Meg
V 2	12AU6	5.3Meg	2.7KΩ	37Ω	25Ω	†13.5KΩ	†1.5KΩ	0Ω
V 3	12AV6	6.8Meg	0Ω	0Ω	13Ω	2.1Meg	5.3Meg	†470KΩ
V 4	50C5	150Ω	470KΩ	90Ω	37Ω	470KΩ	†1.5KΩ	†230Ω
V 5	35W4	0Ω	INF	90Ω	128Ω	142Ω	120Ω	100KΩ

† MEASURED FROM PIN 7 OF V5

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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DUKANE
MODEL 11A75

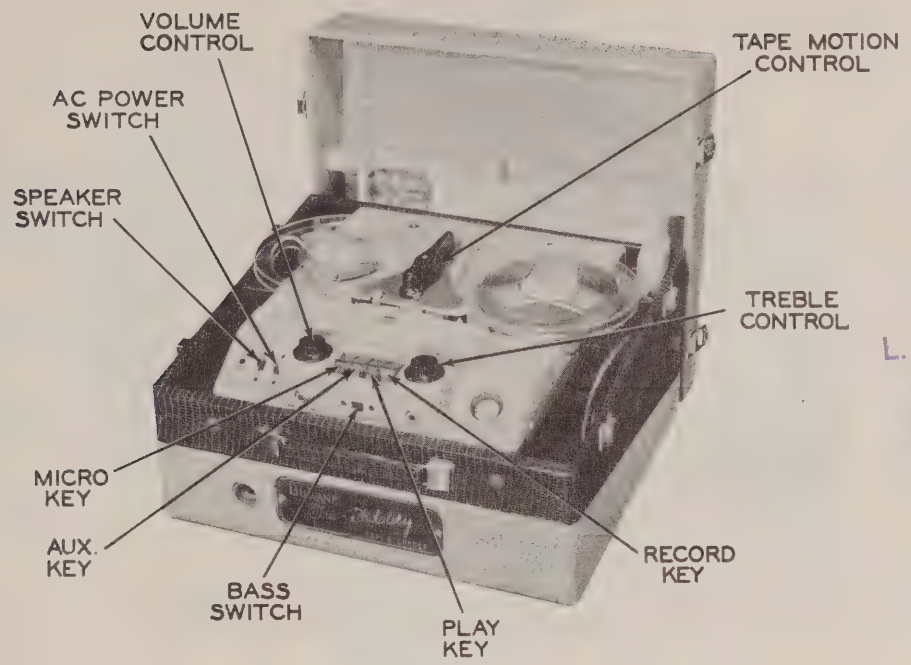

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Figure 1

GENERAL INFORMATION

The DuKane "Tru-Fidelity" Model 11A75 Tape Recorder incorporates a single control which operates the following mechanical functions: Fast Forward, Forward, Off, and Rewind. Four pushbuttons control the amplifier functions for play and record modes of operation.

The DuKane is designed to record and playback two tracks of material on standard width recording tape, which doubles the playing time of a 5" or 7" reel, with no loss of frequency response or quality. Recordings can be made from a radio, television receiver or phonograph, in addition to those made directly from the microphone. Recordings can be played back through the self-contained speaker or an external speaker through use of the Auxiliary Speaker Jack.

This recorder has two tape speeds, 7 1/2" and 3 3/4" per second. Using both tracks of the tape, the recording time is as follows:

Size Reel	Speed 3 3/4"	Speed 7 1/2"
5"	1 hour	1/2 hour
7"	2 hours	1 hour

Model 11A75 is designed to operate on 60 cycle, 105-125 volts, AC supply only.

CAUTION: Severe Damage Will Result If Connection Is Made To A Direct Current (DC) Line.

Manufactured by:

DuKane Corporation

St. Charles, Illinois

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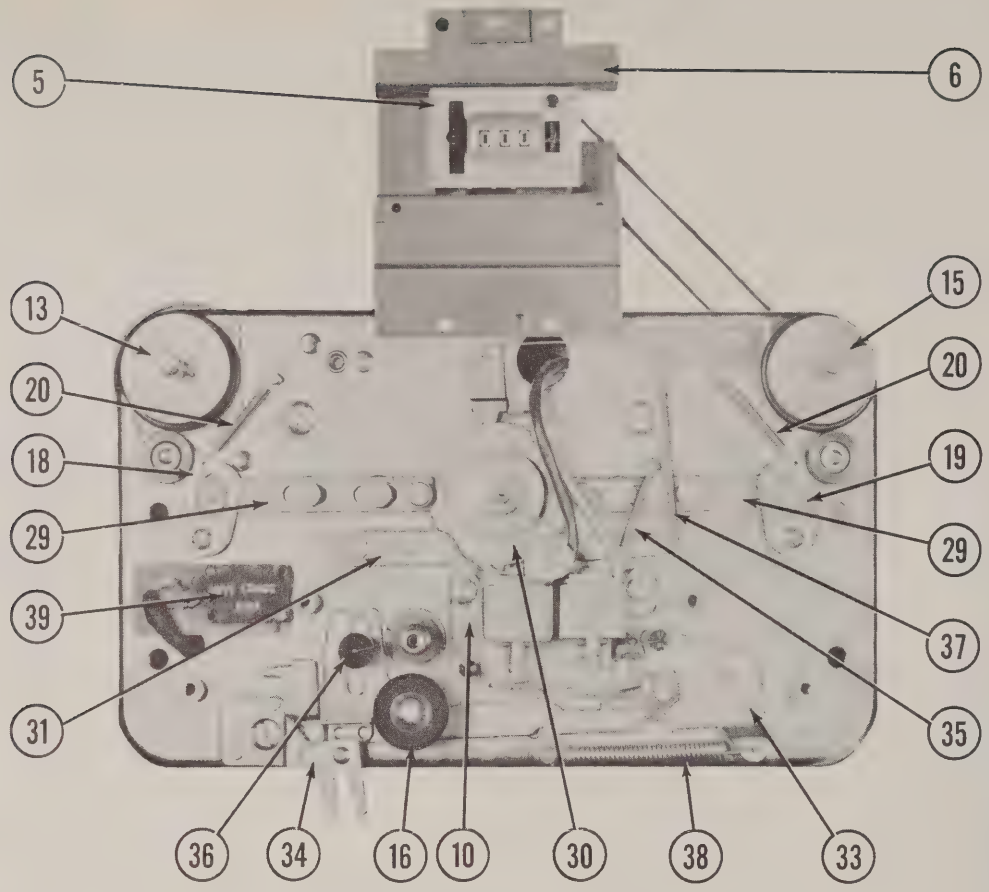

Figure 2

SPECIFICATIONS

Rewind Time-

Full 7" reel - 80 seconds

Fast Forward Time-

Full 7" reel - 100 seconds

Frequency Response - Pre-Amplifier-

At 3 3/4" per second ± 1 1/2db 50 to 7500 CPS.
At 7 1/2" per second ±1 1/2db 50 to 10,000 CPS.

Signal To Noise Ratio-

Recording from microphone - 55db
Distortion less than 1%

Frequency Response - Booster Amplifier-

Flat except in the Series of Serial 6000 which is down approximately 4db at 50 cycles.

Overall Distortion - Pre-Amp. And Booster-

Less than 5% at 5 Watts.

Inputs-

Microphone, Auxiliary, and Public Address.

Outputs-

Phones-High Impediance, Auxiliary Speaker - 8 ohms.

OPERATING INSTRUCTIONS

Preparing The Recorder For Use-

1. Remove the power cord from the storage compartment and plug it into a 115 volt, 60 cycle, AC outlet. Slide the switch marked "Power" up to the "on" position exposing the white dot and the Pilot Light will glow.

2. Select the desired recording speed by lifting the knurled capstan sleeve (64) straight up and off the capstan shaft for 3 3/4" speed or allow it to remain on the shaft for 7 1/2" speed. If the capstan sleeve (64) is removed, place it immediately in the "Capstan Storage" well.

Threading The Tape-

1. Place a reel of tape on the right hand spindle and an empty reel on the left hand spindle making sure the reel slots engage the reel pin on the spindles.

2. Unwind about 18" of tape from the reel. Hold a section of tape straight with both hands and drop the tape in the tape slot making sure the dull coated side of the tape faces the rear of the recorder.

NOTE: This recorder uses Type "A" wound tape, i.e. the dull magnetic coated side faces inward on the reel. If the tape to be used is Type "B" (coated side facing outward) the recording will be made at a very low sound level and the playback will almost be inaudible. To change Type "B" to Type "A" wind, rewind the tape in a half twist.

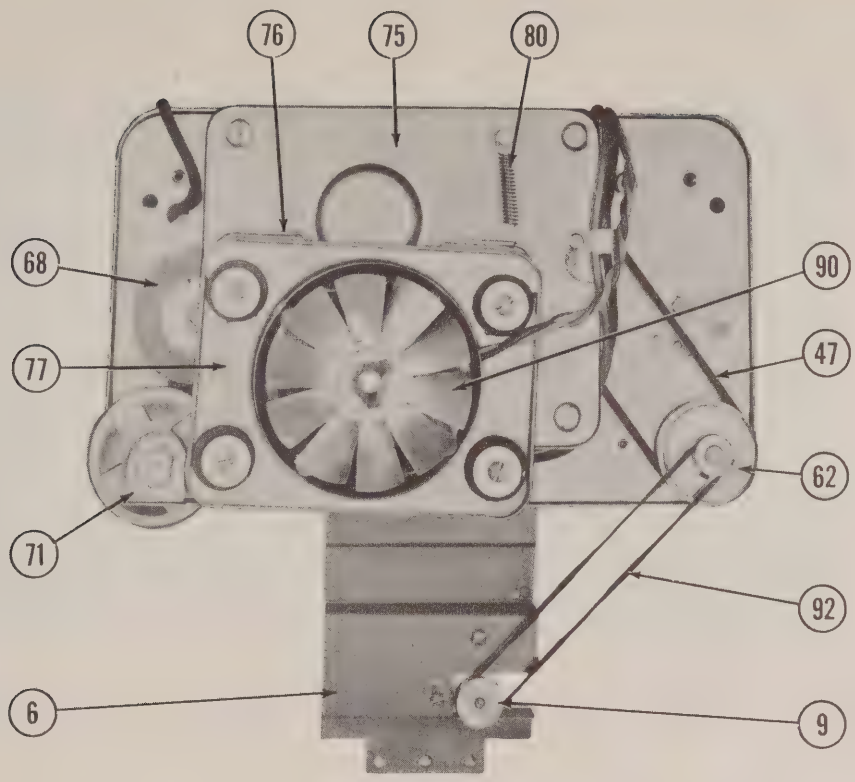

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Figure 3

3. Insert the free end of the tape into one of the three radial slots in the hub of the empty reel. Turn the reel several turns until the tape is secured to the reel and all slack is taken up between reels.

To Record From Microphone-

Remove the microphone from its compartment and plug it into the receptacle marked "Microphone". This automatically disconnects the loudspeaker in the case and eliminates any possibility of feedback or howling. Depress simultaneously the selector keys marked "Micro" and "Record" whereupon the Magic Eye "Level Indicator" will glow. Next, slide the "Bass" switch to "in" or "out" depending on the type of response desired. With the switch at the "out" position the bass notes are diminished. The "Treble" control is inoperative during all recording functions and, therefore, requires no adjustment. Now, speak or play into the microphone while turning up the "Volume" control until the Magic Eye "Level Indicator" almost flickers shut. Hold down the "Micro" and "Record" keys while turning the Tape Motion Control (2) to the "Forward" position and the recording is in process.

To Record From Radio Or TV-

Remove the Radio Connecting Cord from its storage compartment. It has a black bakelite plug on one end while the opposite end splits into an insulated wire and a braided wire each equipped with an eyelet lug. The insulated wire should be connected to the insulated voice coil terminal of the radio or TV speaker and the braided wire should be connected to the grounded loudspeaker terminal. For convenience, two alligator clips have been furnished with the DuKane. Insert the black plug into the receptacle marked "Auxiliary". Depress simultaneously the selector keys marked "Aux" and "Record". Slide the "Speaker" switch up to the "on" position and the "Bass" switch "in" or "out" as desired. Advance the recorder "Volume" control to 5 and turn up the volume on the radio or TV until the Magic Eye "Level Indicator" almost closes. Hold down the "Aux" and "Record" selector keys while turning the Tape Motion Control (2) to "Forward" and the recording is in process.

To Record From Phonograph-

The Phono Connecting Cord is stored in the same place and is similar to the Radio Connecting Cord except that it is equipped with a nickel plated plug. Connect the insulated wire of the Phono Connecting Cord to the insulated wire from any crystal or high impediance pickup cartridge and connect the braided wire to the outer braid of the lead from the pickup cartridge. Insert the plug into the receptacle marked "Auxiliary". Slide the "Speaker" switch up to the "on" position and set the "Bass" switch at "in" or "out" as desired. Depress simultaneously the "Aux" and "Record" selector keys and advance the "Volume" control until the Magic Eye "Level Indicator" almost closes when the phonograph is operating. While holding down the "Aux" and "Record" keys turn the Tape Motion Control (2) to "Forward" and the recording is in process.

Dual Track Recording-

The DuKane is a dual track recorder. Only half the tape width is used for each recording track. To record the second track, remove the full reel from the left hand spindle, turn it over and place it on the right hand spindle. Place the empty reel on the left hand spindle and proceed with the recording as before.

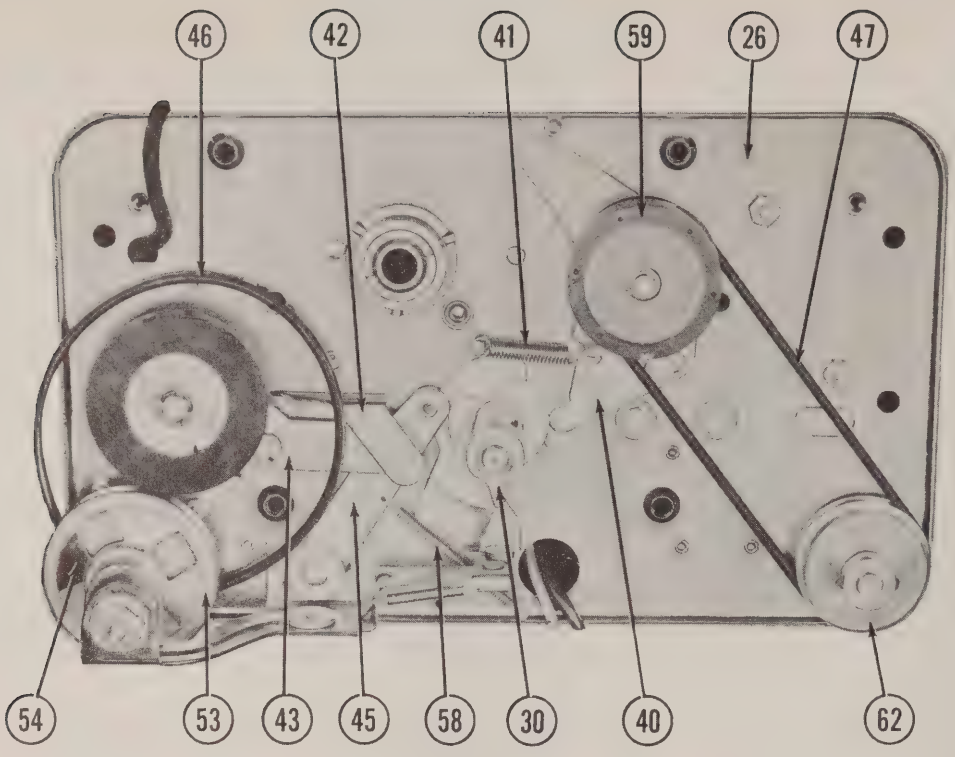

Figure 4

To Play A Recording-

Place a reel of previously recorded tape on the right hand spindle and an empty reel on the left hand spindle. Thread the tape as described under "Threading The Tape". Slide the speaker switch up and the "Bass" switch "in" or "out" as desired. Depress the "Play" selector key and simultaneously turn the Tape Motion Control to "Forward". Adjust the Volume and Treble controls to suit.

Fast Forward-

High-speed forward can be obtained by turning the Tape Motion Control to Fast Forward. This is used primarily in locating a desired portion of a recording in a few seconds.

NOTE: To eliminate any possibility of tape breakage, the Tape Motion Control will not go from the "Fast Forward" position to the "Forward" position without first being returned to the "Stop" position.

Tape Counter-

The Tape Counter can be used in locating various selections on a reel of tape. The counter should be set at zero when a reel of tape is placed on the right hand spindle and the number appearing on the counter at the end of each selection should be noted on the back of the reel carton along with the title of the selection.

To Splice Tape-

1. Cut tape diagonally with an overlap so ends will line up. (Cutting tape on a diagonal will eliminate detection of splice on recording.)

2. Align both ends of tape, glossy side up.

3. Cover aligned ends with splicing tape. Press firmly, exerting pressure, to secure ends evenly and securely.

4. Trim off excess splicing tape. (Cut into the tape very slightly. This eliminates possibility of a sticky splice.)

To Edit Tape-

NOTE: Since it is impossible to edit and splice one track without affecting the other, recordings which are to be edited should be limited to one track only.

To edit, play the recording and cut the tape at the end of the portion you wish to remove. Rewind the tape on an empty reel and cut the tape at the start of the section you wish to remove. Splice together the ends of the remaining tape. For precise editing, listen to the recording and by holding the right hand reel stop the tape at the exact place you wish to edit. Turn the Tape Motion Control to "Stop" and cut the tape at the "Edit Here" mark.

To Monitor With Headphones-

Using a standard two circuit plug, connect any type of high impedance headphones into the receptacle marked "Phones". The headphone leads should connect to the tip and shaft of the plug.

To Use As A Public Address System-

The DuKane can also be used as a public address system. Insert the microphone into the receptacle marked "P.A. Jack" and depress the "Play" selector key. The "Volume" control as well as both "Treble" and "Bass" tone controls are operative so that any volume level and tone characteristic is available.

To Use An External Speaker-

An external speaker or speakers can be plugged into the 8 ohm "Auxiliary Speaker" receptacle using a standard two circuit phone plug whereupon the speaker in the case is disconnected.

Erasing Recorded Material-

As a new recording is made, any previously recorded material is erased from the track that is being recorded on; therefore, no special step is necessary to erase recordings before new recordings are made. The recording on the other half of the tape is not affected. If you wish to erase a recording without recording anything else on the tape, proceed as under "To Record From Microphone" except turn the "Volume" control to "1" and do not plug in the microphone.

ADJUSTMENTS

Play-Record And Erase Head Adjustment-

The record-erase head and bracket assembly (10) has been pre-aligned at the factory and should not be tampered with. When ordering a replacement, both heads mounted and pre-aligned will be supplied by the manufacturer.

Take-Up Spindle Adjustment-

The take-up spindle (13) runs in a single bearing and, therefore, appears to be quite wobbly when compared with the relatively rigid rewind spindle (15). The take-up spindle (13) has two principle functions. These are to take-up the tape after it has passed the heads or, to advance the tape at a high rate of speed when selector control knob (2) is set in "Fast Forward" position.

The diameter of the take-up reel is constantly changing as the tape builds up on the spool and, it is therefore necessary for the reel to rotate at a constant diminishing speed. In this recorder this is accomplished by the use of a slipping clutch. The upper clutch plate (48) is coupled to the flywheel (66) by take-up belt (46) and, power is applied in all positions of the selector control knob (2) except "Stop".

When selector control knob (2) is set in the "Play" position, the clutch actuating arm (71) raises the fast forward drum assembly (53) and, applies pressure against the upper clutch plate (48), thus, transmitting power from the upper clutch plate to the fast forward drum which is coupled to the take-up shaft and bearing assembly (13) through spring washer (54).

The adjustment of the take-up action should be such that tape will not spill from a full take-up reel when the selector control (2) is turned to "Play" from "Stop". The amount of pressure applied against the upper clutch plate (48) by the fast forward drum (53) is controlled by the adjustment of take-up nut (55). It is essential that this pressure never be greater than necessary to keep tape from spilling from a full reel.

When selector knob (2) is turned to "Fast Forward", idler wheel (67) couples flywheel (66) to fast forward drum (53).

When the "Fast Forward" is working properly, it is possible to hold the take-up shaft (13) without stalling the motor and flywheel. But there must be sufficient torque for the "Fast Forward" to operate reliably, even when the take-up reel is full of tape.

The fast forward arm bracket (43) on which the fast forward idler (67) is mounted, and spring washer (54), which controls fast forward action have been set and locked at the factory. It is advisable to avoid changing either one if possible.

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TROUBLES

Fails To Erase And Record-

1. Pressure pad arm actuating spring (10B) broken, resulting in the tape not being held in contact with the heads.

No Drive In "Forward" Position-

1. Capstan roller spring (38) loose or broken resulting in the capstan roller (16) not being held in contact with the capstan shaft.

2. Grease or oil on motor pulley and flywheel. Clean with alcohol.

No Drive In "Rewind" Position-

1. Rewind belt (47) loose. Replace belt.

2. Grease or oil on rewind belt (47). Clean belt and pulley grooves with alcohol.

3. Grease or oil on motor pulley, flywheel, and rewind drive wheel (59). Clean driving surfaces with alcohol.

No Drive In "Fast Forward" Position-

1. Take-up spindle assembly not adjusted properly. See "Take-Up Spindle Adjustment".

2. Grease or oil on motor pulley, flywheel and fast forward drive tire (68). Clean driving surfaces with alcohol.

Speed Variation or "Wow"-

1. Check capstan shaft, capstan roller (16), motor pulley, and flywheel (66) for oil or foreign material. Clean these surfaces with alcohol.

Tape Overruns Or Spills When Changing Position Of Selector Control Knob (2) -

1. Brake arm springs (20) loose or broken. Replace defective spring or springs.

2. Brake arm assembly (18 or 19) out of adjustment. These should be adjusted so that there is a clearance of approximately 1/16" between the brake tire and brake arm when selector control (2) is in the "Forward" position. This adjustment is made by loosening screw (23) and turning eccentric washer (25) to the proper position.

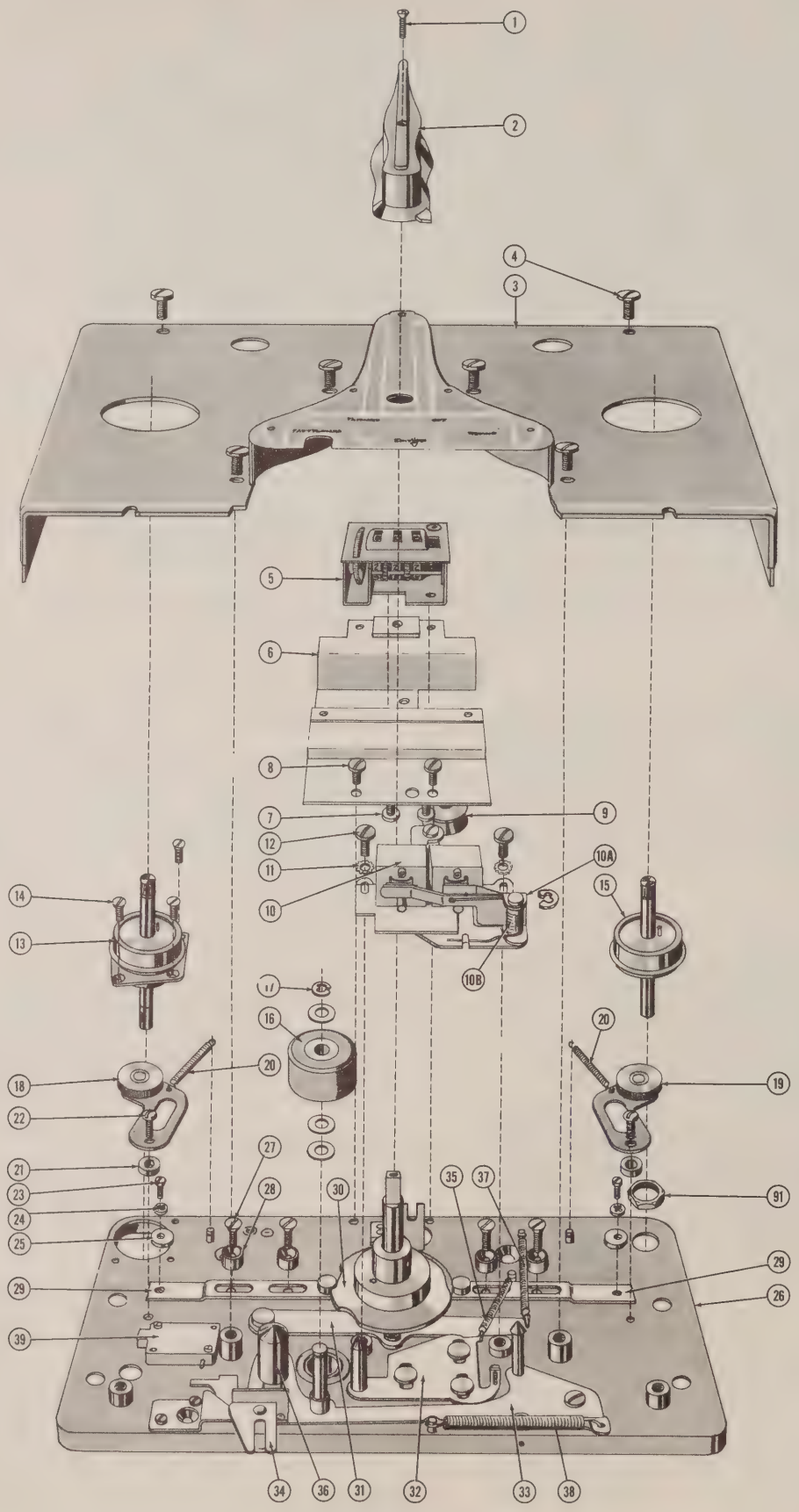

Figure 5 . Exploded View Of Parts Above Baseplate.

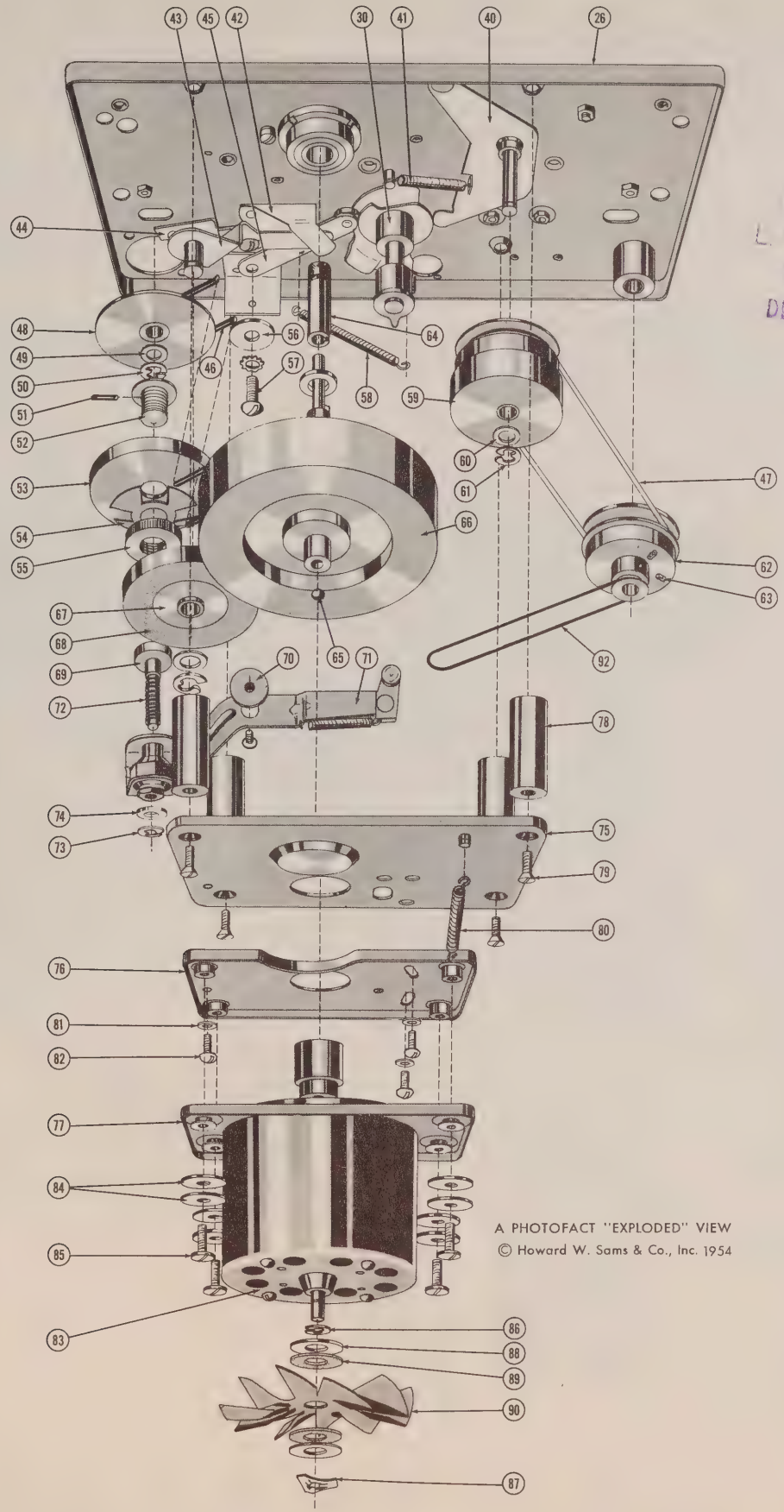

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Figure 6. Exploded View Of Parts Below Baseplate.

LUBRICATION

1. This recorder has been adequately lubricated during manufacture with special silicone oil and greases and should, with normal usage, never require additional lubrication, except for the motor (see #2 below). Do not use conventional oils or grease on the mechanism for they will "creep" to the rubber driving parts and cause irrepairable damage.

2. Place 2 or 3 drops of S. A. E. #20 oil on each motor bearing every three months.

CLEANING

The play-record head, erase head, and capstan roller (16) are subject to an accumulation of tape coating oxide which is worn off the tape as it passes these parts. Clean occasionally with a small piece of cotton or soft cloth dipped in alcohol.

After recording at 3 3/4" speed there will be a minute coating of oxide powder on the capstan. Before installing the 7 1/2" speed capstan, clean the 3 3/4" capstan with a soft cloth or tissue. Occasionally the 3 3/4" capstan and the inner surface of the 7 1/2" capstan should be thoroughly cleaned with alcohol.

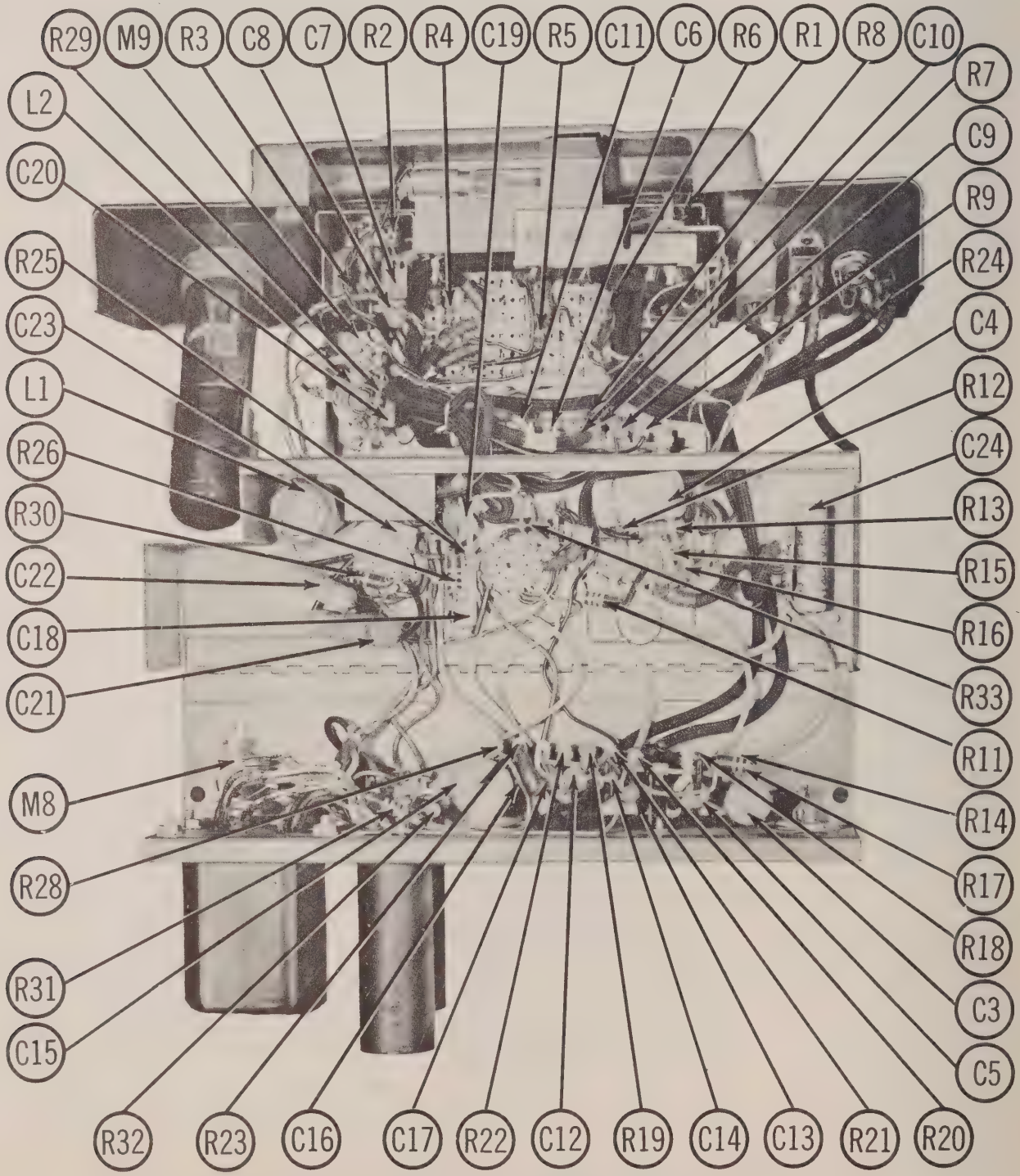

Figure 7. Bottom View Of Model 1A365 Pre-Amp.

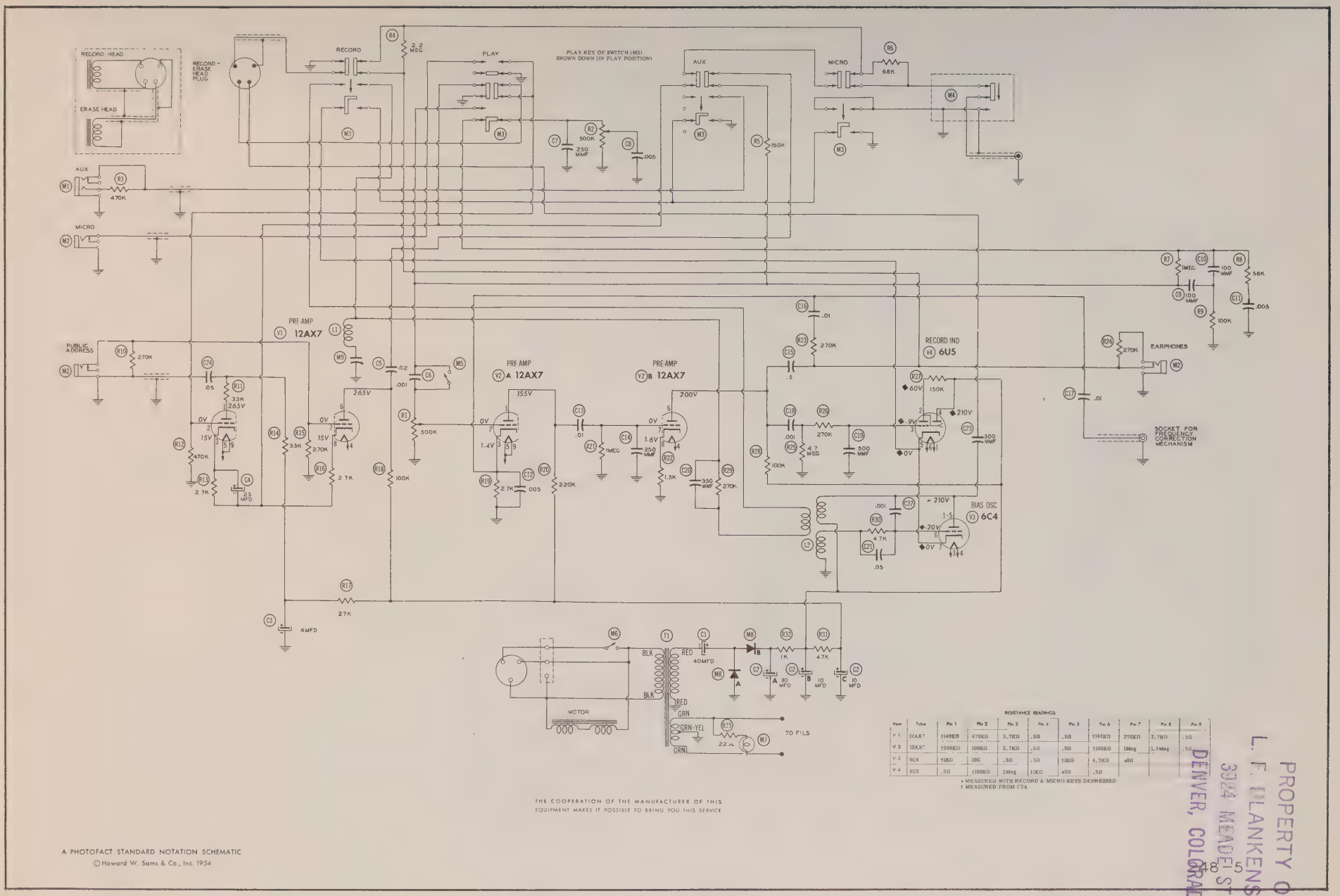

Figure 8. Schematic Of Model 1A365 Pre-Amp.

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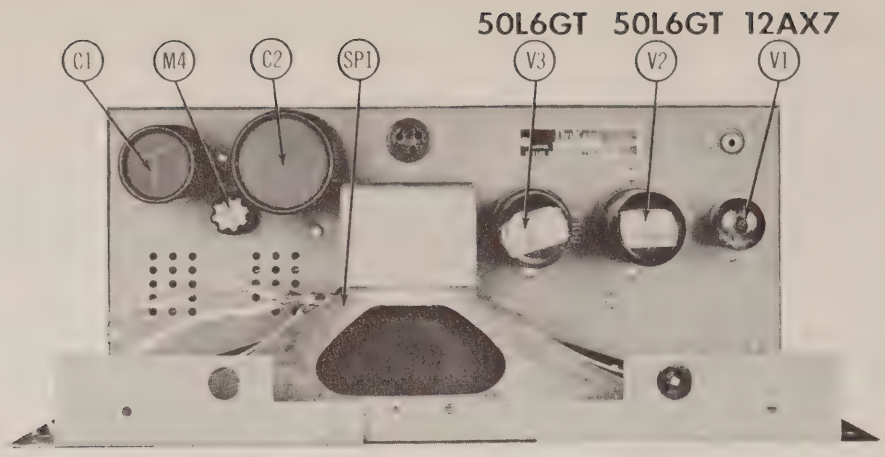

Figure 9. Top View Of Model 1A370 Power Amplifier.

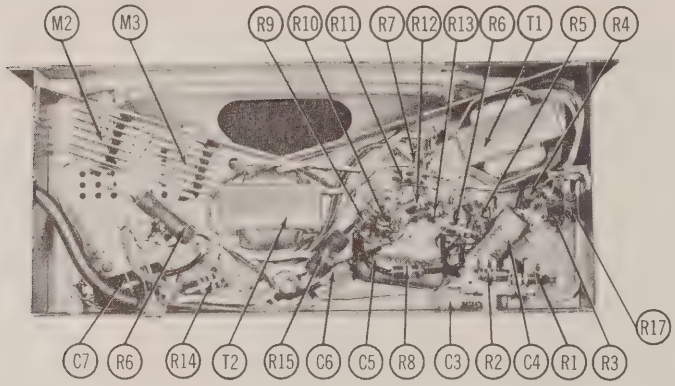

Figure 10. Bottom View Of Model 1A370 Power Amplifier.

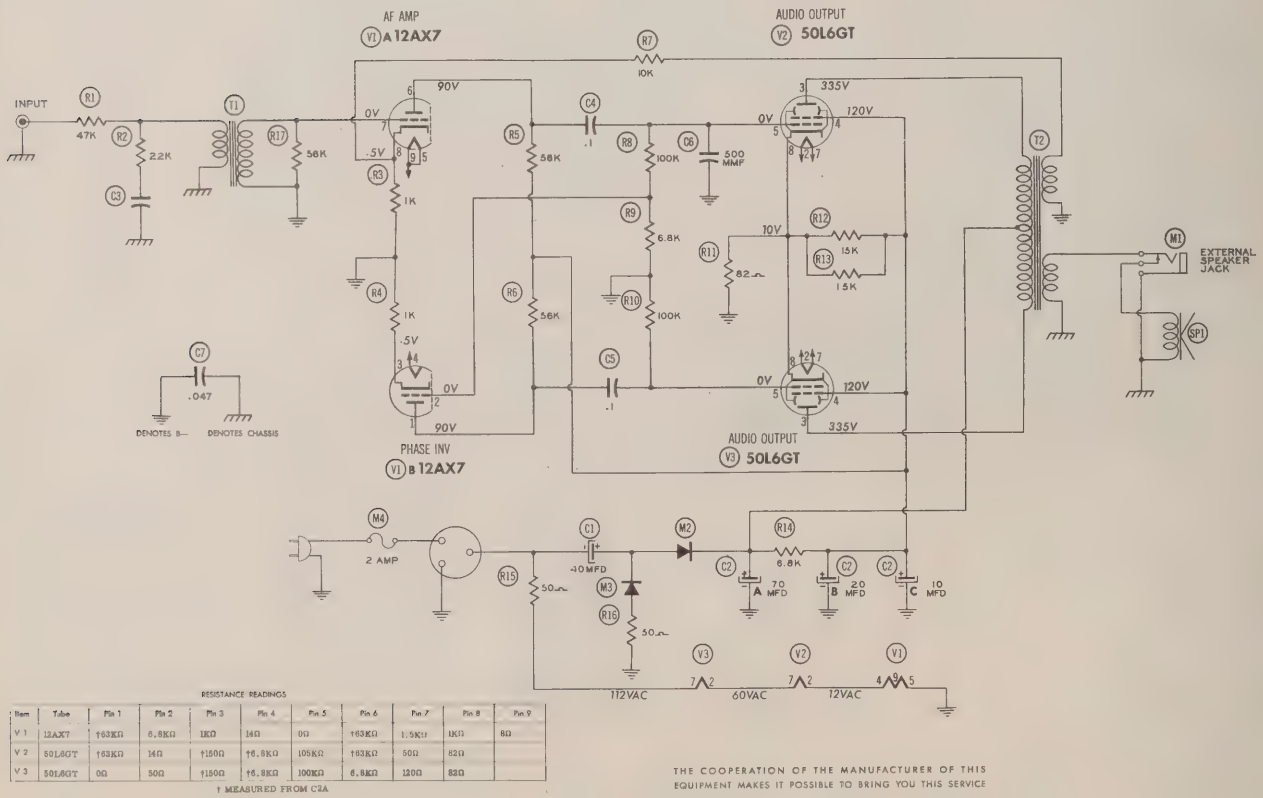

Figure 11. Schematic Of Model 1A370 Power Amplifier.

ELECTRICAL PARTS LIST
MODEL 1A370 POWER - AMP.

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
V1	262-12AX7	12AX7, AF Amp., Phase Inv.	R7	600-0116-103	10KΩ, 1 Watt
V2	262-50L6-GT	50L6-GT, Audio Output	R8	600-0116-104	100KΩ, 1 Watt
V3	262-50L6-GT	50L6-GT, Audio Output	R9	600-0116-682	6.8KΩ, 1 Watt
C1	199-2025-406	Elect. Cap., 40mfd.@250V.	R10	600-0116-104	100KΩ, 1 Watt
C2A	199-2935	Elect. Cap., 70mfd.@350V.	R11	600-0116-820	82Ω, 1 Watt
C2B		Elect. Cap., 20mfd.@350V.	R12	600-0116-153	15KΩ, 1 Watt
C2C		Elect. Cap., 10mfd.@350V.	R13	600-0116-153	15KΩ, 1 Watt
C3	199-4021-503	.05mfd. @400V.	R14	600-0153-682	6800Ω, 2 Watt
C4	199-4021-104	.1mfd. @400V.	R15	600-1008-500	50Ω, 5 Watt
C5	199-4021-104	.1mfd. @400V.	R16	600-1008-500	50Ω, 5 Watt
C6	199-3001-501	500mmf.	R17	600-0116-563	56KΩ, 1 Watt
C7	199-4037-473	.047mfd. @600V.	T1	710-1011	Input Transformer
R1	600-0116-473	47KΩ, 1 Watt	T2	710-2048	Output Transformer
R2	600-0116-223	22KΩ, 1 Watt	SP1	S-12100	Speaker
R3	600-0116-102	1000Ω, 1 Watt	M1	415-4	Jack - Closed Circuit
R4	600-0116-102	1000Ω, 1 Watt	M2	595-11	Selenium Rect. - 150 M.A.
R5	600-0116-563	56KΩ, 1 Watt	M3	595-11	Selenium Rect. - 150 M.A.
R6	600-0116-563	56KΩ, 1 Watt	M4	320-835-0200	Fuse - 2 Ampere

ELECTRICAL PARTS LIST
MODEL 1A365 PRE-AMP.

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
V1	262-12AX7	12AX7, Pre-Amp.	R9	600-0116-104	100KΩ, 1 Watt
V2	262-12AX7	12AX7, Pre-Amp.	R10	600-0080-274	270KΩ, 1/2 Watt
V3	262-6C4	6C4, Bias Oscillator	R11	600-0116-333	33KΩ, 1 Watt
V4	262-6U5	6U5, Record Indicator	R12	600-0116-474	470KΩ, 1 Watt
C1	199-2025-406	Elect. Cap., 40mfd.@250V.	R13	600-0116-272	2700Ω, 1 Watt
C2A	199-2930-00	Elect. Cap., 30mfd.@350V.	R14	600-0116-333	33KΩ, 1 Watt
C2B		Elect. Cap., 10mfd.@350V.	R15	600-0116-274	270KΩ, 1 Watt
C2C		Elect. Cap., 10mfd.@350V.	R16	600-0116-272	2700Ω, 1 Watt
C3	199-2037-405	Elect. Cap., 4mfd.@450V.	R17	600-0116-273	27KΩ, 1 Watt
C4	199-2001-256	Elect. Cap., 25mfd.@25V.	R18	600-0116-104	100KΩ, 1 Watt
C5	199-4020-203	.02mfd. @400V.	R19	600-0116-272	2700Ω, 1 Watt
C6	199-4030-102	.001mfd. @600V.	R20	600-0116-224	200KΩ, 1 Watt
C7	199-3001-251	250mmf	R21	600-0116-105	1 Meg., 1 Watt
C8	199-4030-502	.005mfd. @600V.	R22	600-0116-152	1500Ω, 1 Watt
C9	199-3001-101	100mmf.	R23	600-0116-274	270KΩ, 1 Watt
C10	199-3001-101	100mmf.	R24	600-0080-274	270KΩ, 1/2 Watt
C11	199-4030-502	.005mfd. @600V.	R25	600-0080-475	4.7Meg., 1/2 Watt
C12	199-4030-502	.005mfd. @600V.	R26	600-0116-274	270KΩ, 1 Watt
C13	199-4020-103	.01mfd. @400V.	R27	600-0080-154	150KΩ, 1/2 Watt
C14	199-3001-251	250mmf.	R28	600-0116-104	100KΩ, 1 Watt
C15	199-4022-504	.5mfd. @ 400V.	R29	600-0116-274	270KΩ, 1 Watt
C16	199-4020-103	.01mfd. @400V.	R30	600-0116-472	4700Ω, 1 Watt
C17	199-4020-103	.01mfd. @400V.	R31	600-0116-473	47KΩ, 1 Watt
C18	199-4030-102	.001mfd. @600V.	R32	600-0116-102	1000Ω, 1 Watt
C19	199-3001-501	500mmf.	R33	600-0116-220	22Ω, 1 Watt
C20	199-3001-351	350mmf.	T1	710-4076	Power Transformer
C21	199-4021-503	.05mfd. @400V.	L1	393-3	RF Coil, 65MH.
C22	199-4030-102	.001mfd. @600V.	L2	535-4	Bias Oscillator Coil
C23	199-3001-501	500mmf.	M1	415-7	Jack - 3 CCT.
C24	199-4021-503	.05mfd. @400V.	M2	415-4	Jack - Closed CCT.
R1	601-61	Volume Control, 500KΩ	M3	680-163	Switch - 4 Plunger - Record, Play, Aux., and Micro.
R2	601-61	Treble Control, 500KΩ			
R3	600-0080-474	470KΩ, 1/2 Watt	M4	680-167	Speaker Switch - S.P.D.T.
R4	600-0080-225	2.2Meg., 1/2 Watt	M5	680-23	Out-Bass-In Switch, S.P.S.T.
R5	600-0080-154	150KΩ, 1/2 Watt	M6	680-165	Power Switch - S.P.S.T.
R6	600-0080-683	68KΩ, 1/2 Watt	M7	456-1	Pilot Light, Type #47
R7	600-0116-105	1 Meg., 1 Watt	M8A	595-10	Selenium Rectifier
R8	600-0116-563	56KΩ, 1 Watt	M8B		Selenium Rectifier
			M9	199-9025	Variable Cap., Bias Adj.

3925 MEADE ST.
DENVER, COLORADO

MECHANICAL PARTS LIST

"The part Numbers listed here are for identification purposes when writing or talking about the mechanism." In some cases a manufacturer will supply sub-assemblies rather than individual parts for service replacement. Write Du Kane for their current "Replacement Assembly Parts List for Du Kane Drive Mechanism Model #22A10."

Ref. No.	Part No.	Description
1	924-101-0406	#4-40x3/8" Oval Phillips Head Screw
2	440-76-01	Knob-Selector Control, Black Nylon
3	567-224-11	Plate-Rear Top, Royalite
4	903-101-0806	#8-32x3/8 St. Side Binding Hd. Slotted Screw
5	213-1-00	Counter
6	147-534-04	Counter Bracket
7	903-103-0604	#6-32x1/4" Straight Side Binding Slotted Hd. Screw
8		Counter Bracket Mounting Sc.
9	578-18-01	Counter Pulley 3/4" Brass
10	115-574-00	Record-Erase Hd. & Bracket Assembly
10A	115-569	Pressure Pad Arm Assembly
10B	650-53	Pressure Pad Arm Actuating Assembly
11	466-014-08	#8 Lockwasher
12	903-103-0804	#8-32x1/4 Bind. Hd. M. Sc.
13	115-578-05	Take-up Shaft & Bearing Assy.
14	902-103-0406	#4-40x3/8 Flat Hd. Screw
15	115-565-03	Rewind Shaft Assembly
16	612-2-07	Capstan Roller
17	750-99-00007	Truarc Washer #5133-31
18	115-586-03	Brake Arm (Left)
19	115-587-03	Brake Arm (Right)
20	650-54-00	Brake Arm Spring
21	634-47-02	Brake Arm Spacer 3/8" Dia.
22	901-103-0806	#8-32x3/8 Round Hd. Screw
23	905-103-0604	#6-32x1/4 Fil. Hd. Screw
24	466-014-06	#6 I. T. Shakeproof Lockwasher
25	750-99-00020	Essentric .074" Washer
26	567-167-09	Top Plate
27	902-103-0609	#6-32x9/16" Flat Hd. Screw
28	634-112-02	Brake Slide Spacer
29	567-164-03	Brake Slide Plate
30	115-581-03	Control Shaft Assembly
31	115-588-03	Detent Arm Assembly
32	115-591-01	Detent Slide Plate Assembly
33	115-582-04	Capstan Roller Arm Assembly
34	179-10-02	Switch Release Cam
35	650-58-00	Detent Slide Plt. Spring
36	564-44-03	Tape Guide Pin
37	650-62-00	Detent Arm Spring
38	650-55-00	Capstan Roller Spring
39	680-195-01	Speed Equalization Switch
40	115-585-01	Rewind Arm Assembly
41	650-56-00	Rewind & Fast Fwd. Spring
42	147-553-02	Fast Fwd. Assy. Hanger
43	115-815-00	Fast Fwd. Arm Staking Assy.
44	147-539-01	Fast Fwd. Mounting Bracket
45	108-39-01	Fast Fwd. Lever Arm
46	152-10-00	Take-Up Belt
47	152-2-01	Rewind Belt
48	115-579-03	Upper Clutch Plate Assy.
49	750-99-00037	Washer
50	750-99-00018	Truarc Washer 5133-31
51	564-85-03	Pin
52	384-5-05	Clutch Plate Hub (Lower)
53	115-812-00	Fast Fwd. Drum Assembly
54	750-99-00042	Spring Washer
55	530-99-00059	Take-Up Nut
56	750-01-00024	Washer
57	903-103-0804	#8-32x1/4 Binder Hd. Screw
58	650-54-00	Brake Arm Spring
59	115-537-04	Rewind Drive Assembly
60	750-99-00035	Washer
61	750-99-00007	Truarc Washer #5133-31
62	578-5-02	Rewind Shaft Pulley
63	942-141-0803	#8-32x3/16" Hex. Socket Hd. Sc.
64	630-2-00	Capstan Sleeve
65	137-14-00	Ball Bearing - 156" Dia.
66	115-566-03	Flywheel Assembly
67	758-10-01	Fast Fwd. Wheel (Metal only)
68	758-11-01	Fast Fwd. Wheel (Rubber Tire)
69	115-795-01	Clutch Actuating Pin Assy.
70	670-30-03	Clutch Arm Stud
71	115-580-02	Clutch Actuating Arm Assy.
72	650-59-00	Clutch Adjustment Spring
73	750-99-00007	Truarc Washer #5133-18
74	750-01-00021	Washer
75	567-170-03	Bottom Plate
76	567-169-03	Motor Swing Plate
77	567-166-05	Motor Mounting Plate
78	634-41-01	Main Plate Spacers
79	902-103-4006	#10-32x3/8 Flat Hd. Screw
80	650-61-00	Swing Plate Spring
81	750-01-00021	Washer
82	901-103-4006	#10-32x3/8 Round Hd. Screw
83	115-816-00	Motor & Drive Roller Assy.
84	750-01-00024	Washer
85	903-103-0812	#8-32x3/4 Binder Hd. Screw
86	750-99-00018	Truarc Washer #5133-31
87	750-99-00019	Truarc Washer #5305-31
88	750-01-00023	Washers
89	750-51-00005	Felt Washers
90	286-2-00	Fan
91	530-99-00035	Hex. Nut
92		Counter Drive Belt

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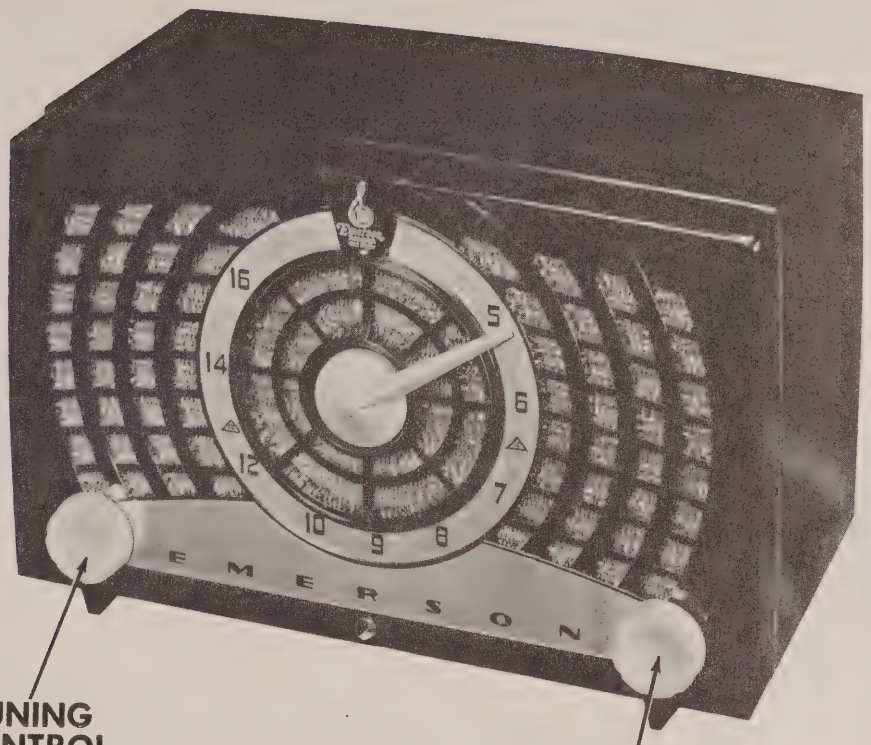
EMERSON
MODEL 778-B (Ch. 120199B)



EMERSON
MODEL 778-B (Ch. 120199B)

TRADE NAME	Emerson Model 778-B (Ch. 120199B)
MANUFACTURER	Emerson Radio & Phono Corp., 111 Eighth Ave., New York, N.Y.
TYPE SET	AC-DC Operated AM Superheterodyne Receiver
TUBES (Five)	Types 12BE6 Conv., 12BA6 IF Amp., 12AT6 Det.-AVC-AF Amp., 50C5 Audio Output, 35W4 Rectifier
POWER SUPPLY	105-125 Volts AC-DC RATING .22 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	540-1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-. Loop should be maintained in same relative position to chassis as when receiver is in cabinet. Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.001MFD	High side to pin 7 (grid) of 12BE6 (V1). Low side to B-.	455KC (400~Mod)	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2.		Loop	1620KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		"	1400KC	Tune to 1400KC signal	"	A6	"

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PARTS LIST AND DESCRIPTIONS

EMERSON
MODEL 778-B (Ch, 120199B)

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		EMERSON PART No.	STANDARD REPLACEMENT		
V1	Converter	12BE6	12BE6	7CH	
V2	IF Amplifier	12BA6	12BA6	7BK	
V3	Det.-AVC-AF Amp	12AT6	12AT6	7BT	
V4	Audio Output	50C5	50C5	7CV	
V5	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	EMERSON PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	30	150	925218	PRS150/30-50		BBRD5315		TCD497	TVA-2450	Red Green
B	50	150								
C2	.05	200	923554	P288-05	DF-503	PJ2S5		PT415	2TM-S5	
C3A	220		♦923024	♦PA-113-1	♦PC-150	♦116TM1	♦1408-01		♦DT-1	
B	2000									
C	5000									
D	250									
E										
C4	.02	400	923524	P488-02		CUB4S2		PT412	4TM-S2	
C5	.05	400	923554	489ZX-05	DF-503	PJ4S5		PT415	4TM-S5	
C6	.1	400	923515	P488-1	DF-104	CUB4P1		PT401	4TM-P1	

♦ Items C3A, C3B, C3C, C3D, C3E, R5A, R5B and R5C are combined in one unit.
When replacing items separately C3D and C3E should total 250MMF.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	EMERSON PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	500KΩ	½	390062	Q13-133	A47-500K-Z	BSK-60-S	U-48	Volume
B	Shaft		Not Req.	Not Req.	KSS-3	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWE-12	Not Req.	US-26	Attach to R1A

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	EMERSON PART No.	IRC PART No.	
R2	22KΩ	½		BTS-22K	
R3	120Ω	½	340272	BTS-120	
R4	3.3Meg	½	351332	BTS-3.3Meg	
R5A	6.8Meg	½		BTS-6.8Meg	
B	470KΩ	½	♦923024	BTS-470K	
C	470KΩ	½		BTS-470K	

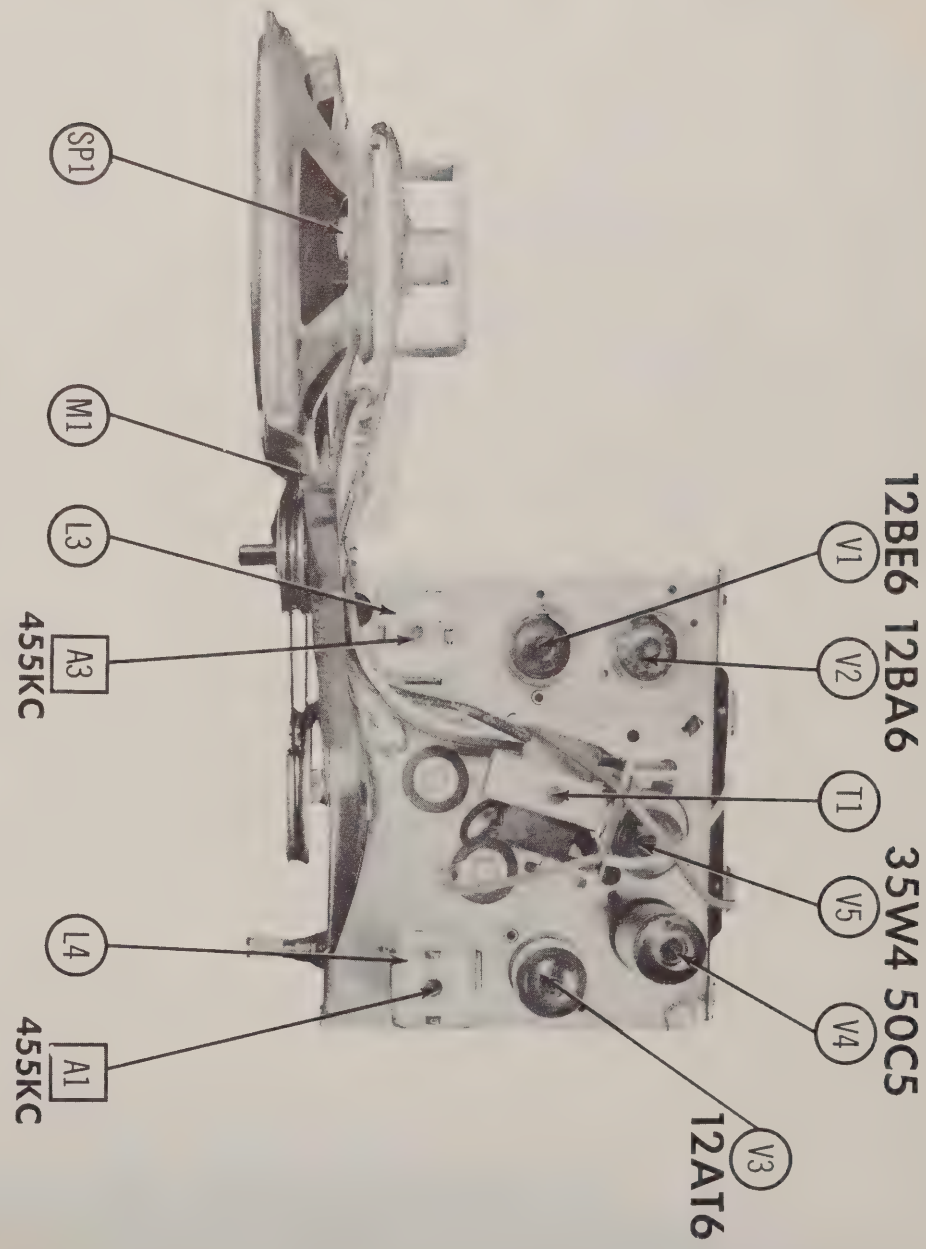
ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	EMERSON PART No.	IRC PART No.	
R6	10KΩ	½	350732	BTS-10K	
R7	150Ω	½	340292	BTS-150	
R8	1500Ω	1	380532	BTA-1500	
R9	18Ω	½	340072	BTS-18	

♦ Items R5A, R5B, R5C, C3A, C3B, C3C, C3D, C3E are combined in one unit.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	EMERSON PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	
T1	2.4KΩ	3.2Ω	734089	A-3332	A-3025	S-12X	Z1101		

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	EMERSON PART No.	JENSEN PART No.	QUAM PART No.	
SP1	4"	PM	3.2Ω	180111	ST-113 Mod. P4-X	4A07	

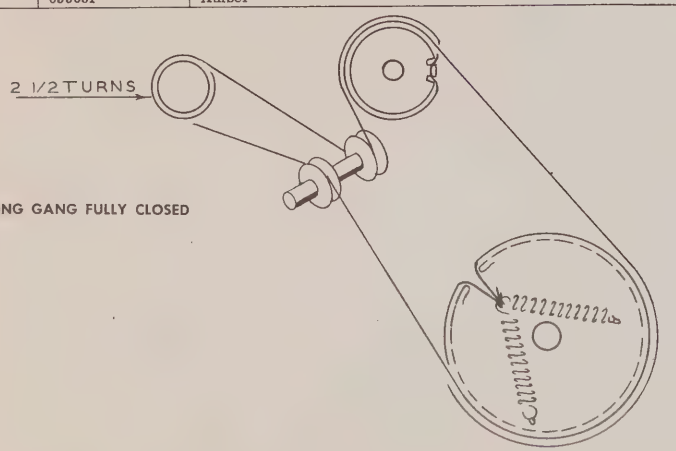
COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	EMERSON PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Loop Ant.	0Ω	3.3Ω	700088				
L2	Osc. Coil	.5Ω	6Ω	716076	14-1073		69-Osc. †	
L3	Input IF	17Ω	17Ω	720033	16-6758	BC-352	12-C1	
L4	Output IF	17Ω	17Ω	720033	16-6758	BC-353	12-C2	

† Drill mounting hole.

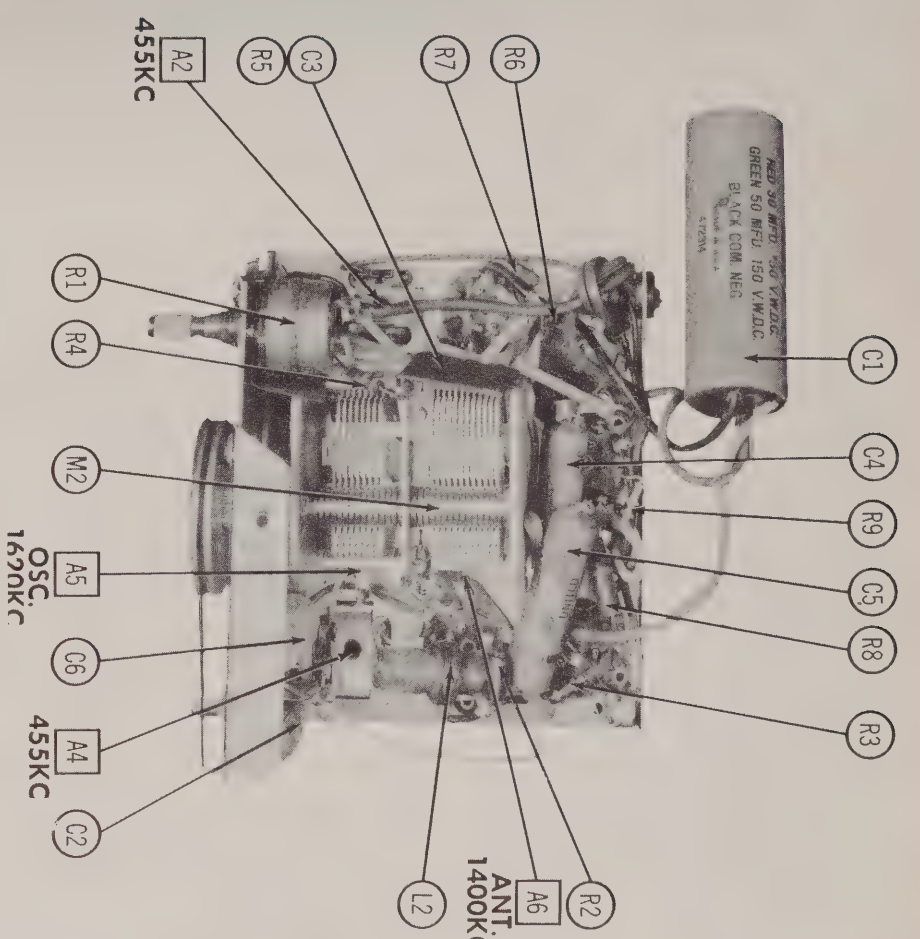
MISCELLANEOUS

ITEM No.	PART NAME	EMERSON PART No.	NOTES
M1	Dial Light		#47 Bayonet
M2	Tuning Cap.	900105	32-390 & 29-175MMF
	Cabinet	140547	Ebony
	Cabinet	140547A	Ivory
	Cabinet	140547B	Red
	Cabinet	140547C	Green
	Knob	460162-S	Tuning & volume-gold
	Pointer	460382	Gold
	Insert	411595	Gold
	Dial Ring	411596	Gold
	Jewel	635031	Amber



DRIVE CORD STRINGING

CHASSIS—BOTTOM VIEW



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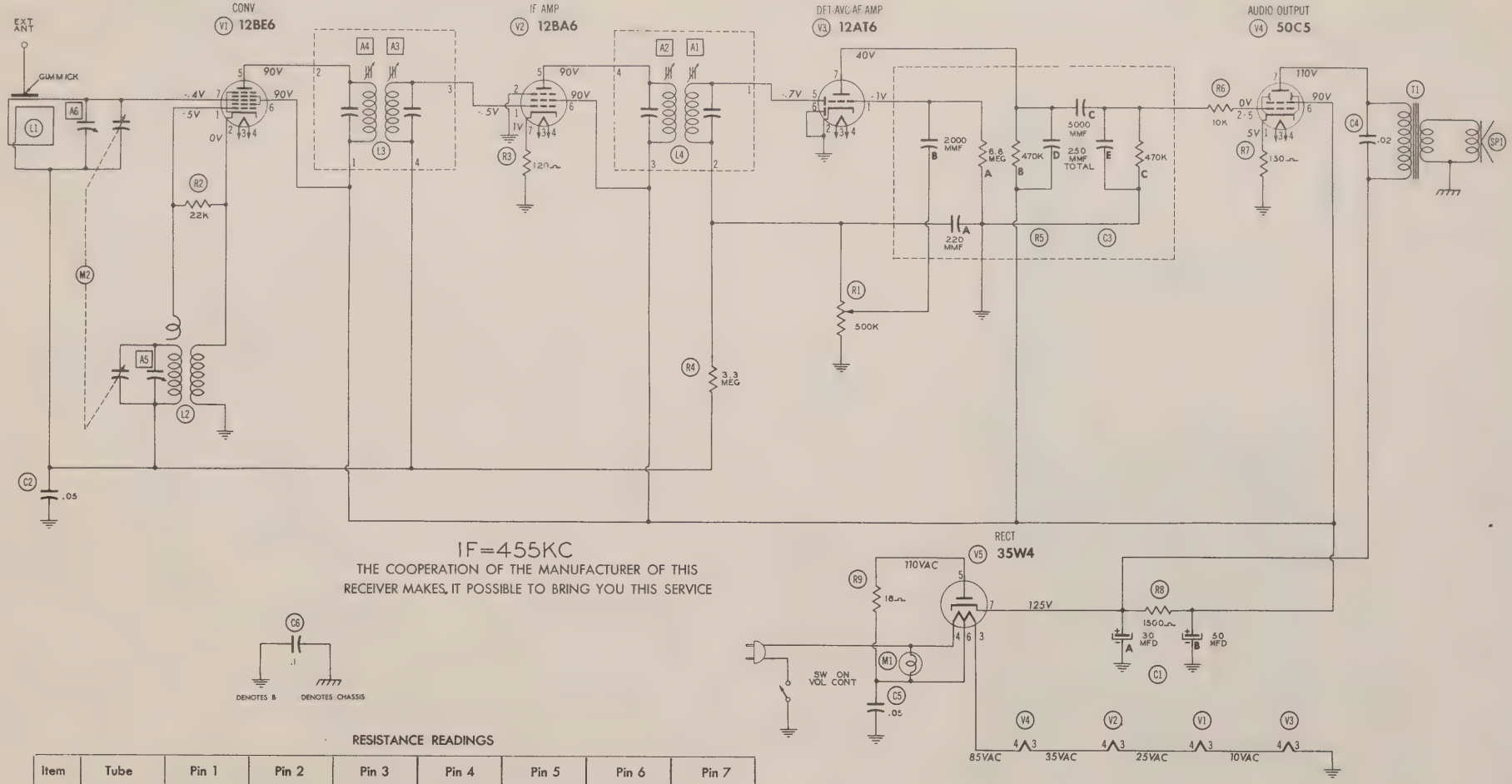
EMERSON
MODEL 778-B (Ch. 120199B)



IF=455KC

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RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	22KΩ	.8Ω	13Ω	25Ω	†1.5KΩ	†1.5KΩ	3.8Meg
V 2	12BA6	3.8Meg	0Ω	25Ω	37Ω	†1.5KΩ	†1.5KΩ	120Ω
V 3	12AT6	6.8Meg	0Ω	0Ω	13Ω	500KΩ	0Ω	†470KΩ
V 4	50C5	150Ω	480KΩ	37Ω	88Ω	480KΩ	†1.5KΩ	†200Ω
V 5	35W4	INF	INF	88Ω	125Ω	142Ω	118Ω	300KΩ

† MEASURED FROM PIN 7 OF V5

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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PHOTOFACT* Folder

*TRADE MARK

RETMA MEMBER

FLEETWOOD
MODEL 610

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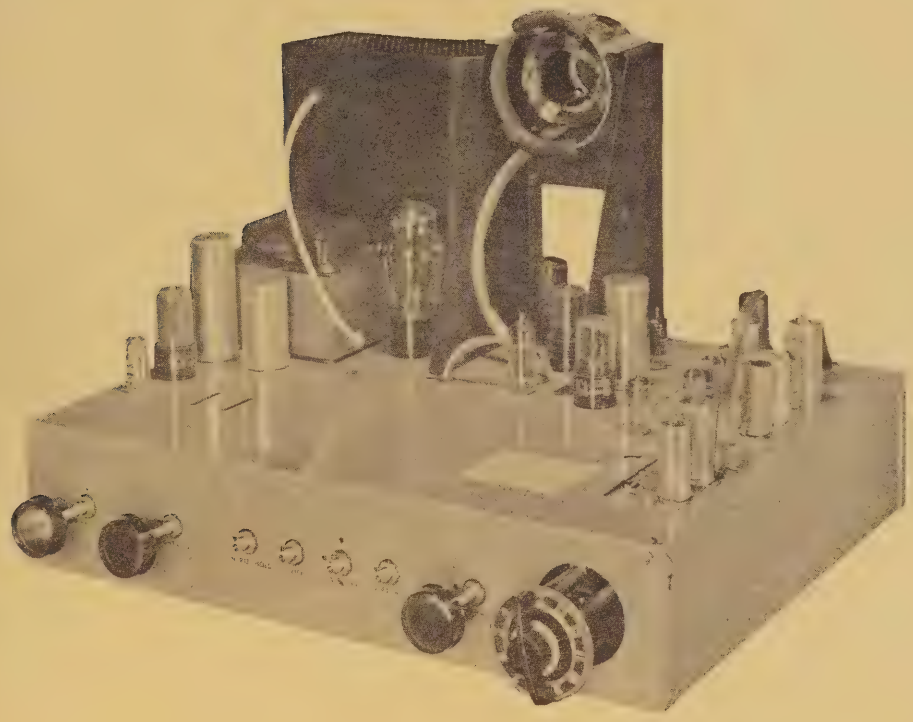

FLEETWOOD
MODEL 610

MODEL 610

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DATE 8–54 SET 248 FOLDER 7

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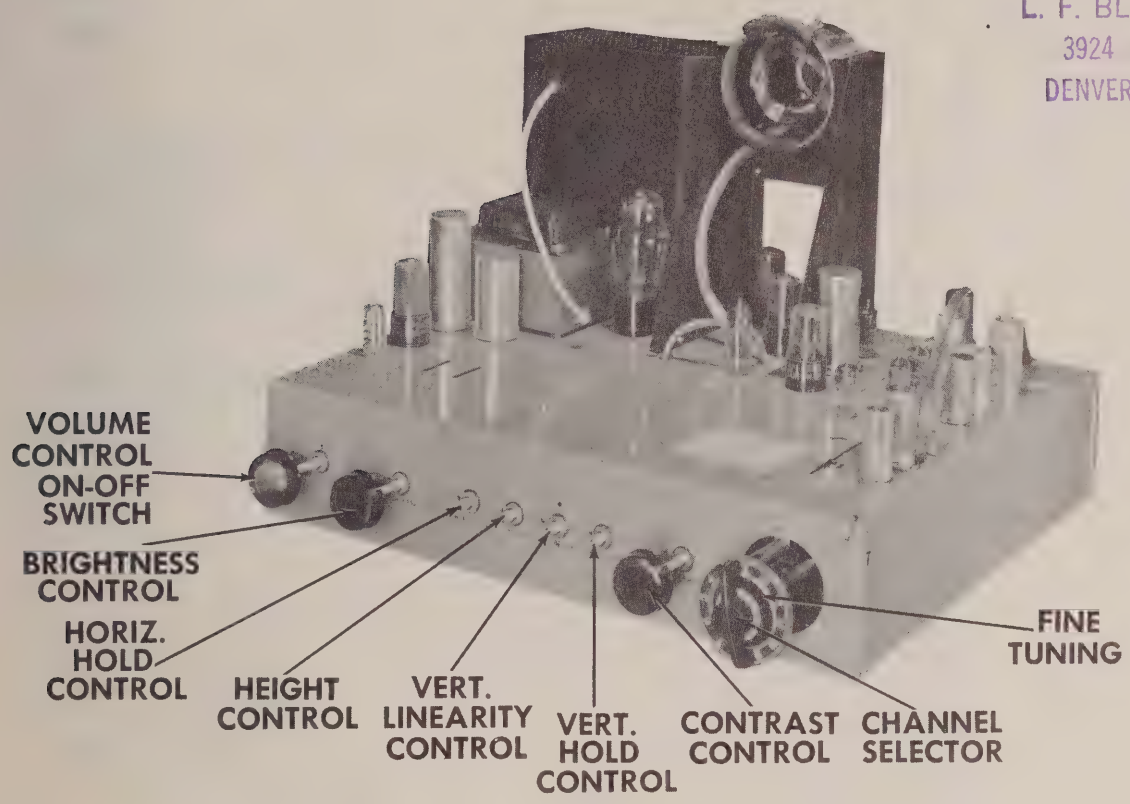

FLEETWOOD
MODEL 610

TRADE NAME	Fleetwood Model 610
MANUFACTURER	Conrac, Inc., 649 W. Foothill Blvd., Glendora, Calif.
TYPE SET	Television Receiver
TUBES	Twenty-three
POWER SUPPLY	110-120 Volts AC-60 Cycle RATING 1.86 Amp. @ 117 Volts AC
TUNING RANGE–	Channels 2 thru 13, Video IF 25.75MC, Sound IF 21.25MC (Intercarrier)

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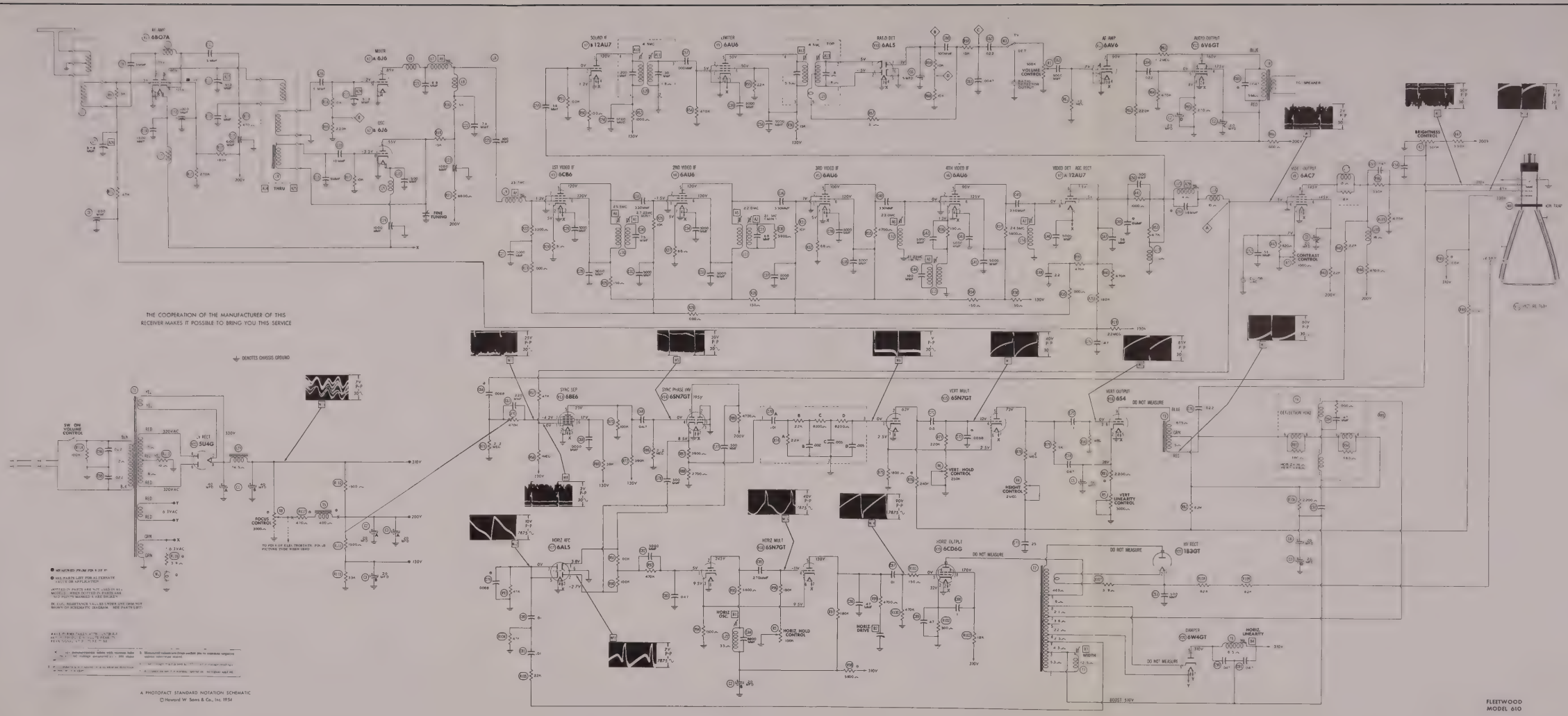
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FLEETWOOD MODEL 610

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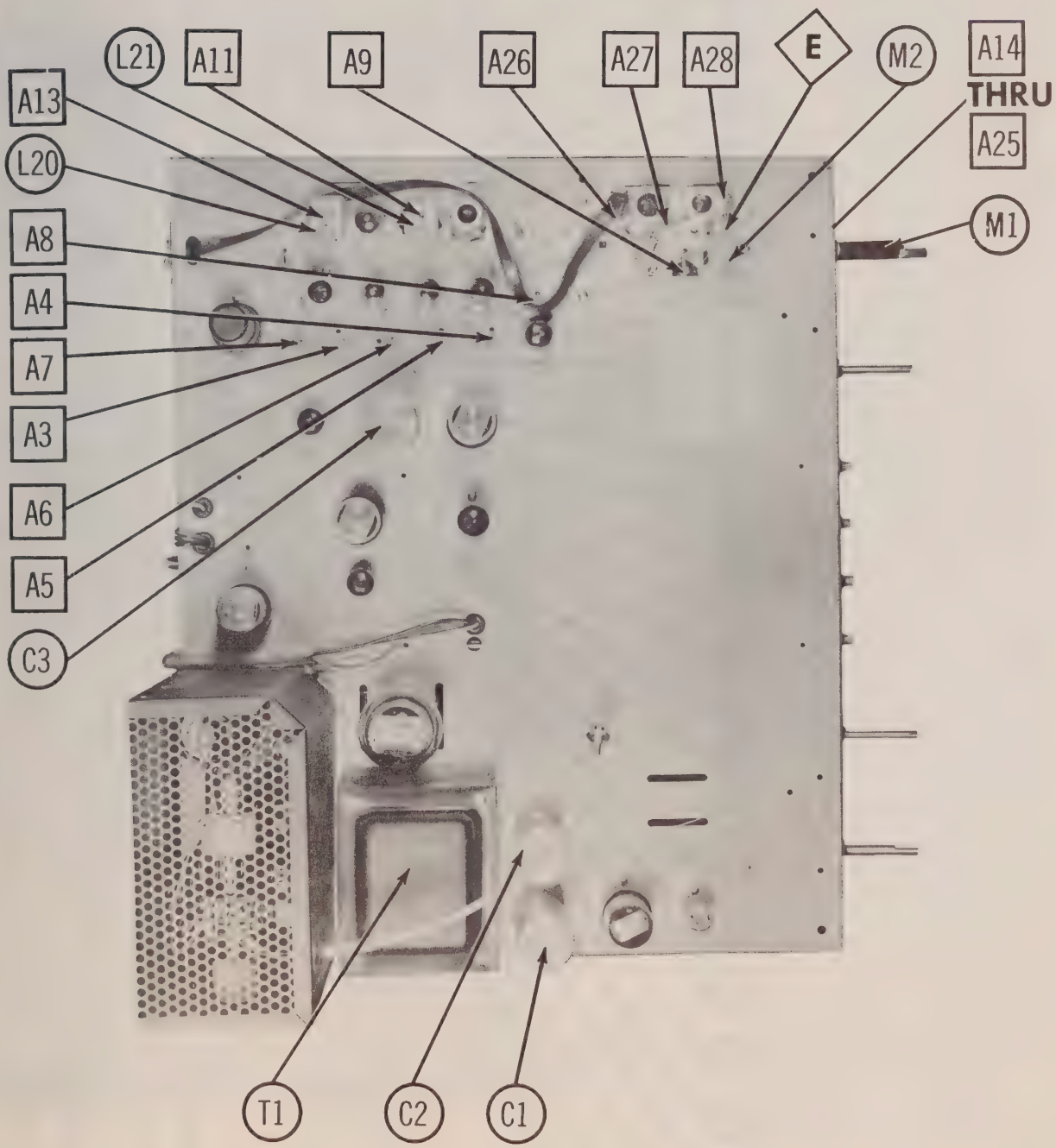
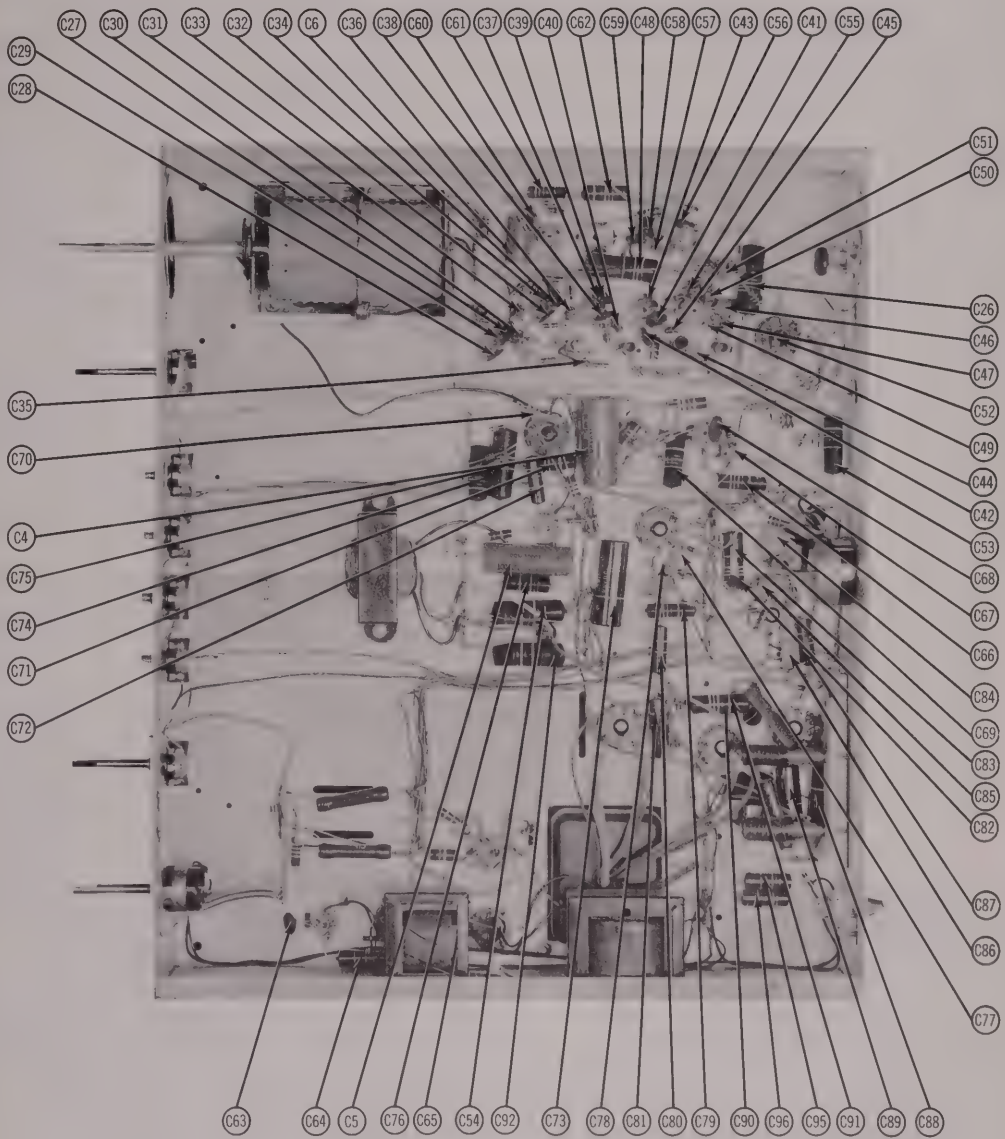


CHASSIS TOP VIEW

SET 248 FOLDER 7



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MODEL 610
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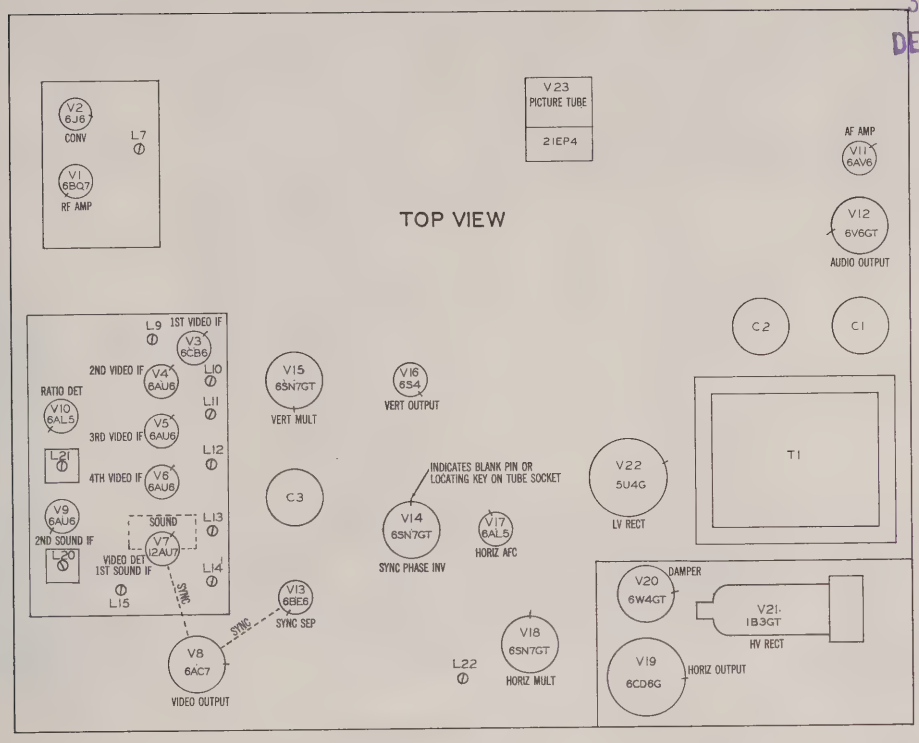
TUBE PLACEMENT CHART



FLEETWOOD
MODEL 610

TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - V22

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V2, V3, V4, V5, V6, V7
No pic, no sound, has snow - V1, V2, V3
No pic, has sound, has raster - V8, V23
Has pic, no sound - V7, V9, V10, V11, V12

SYNC FAILURE
No vert. sync - V14, V15
No horiz. sync - V14, V17, V18
No vert. or horiz. sync - V13, V14

SWEEP FAILURE
No raster, has sound - V18, V19, V20, V21, V23
No vertical deflection - V15, V16
Poor vert. linearity or foldover - V15, V16
Poor horiz. linearity or foldover - V18, V19, V20
Narrow picture - V18, V19, V20, V21, V22
Vert. off freq. - V14, V15
Horiz. off freq. - V14, V17, V18

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped and kept away from the chassis. Do not remove the horizontal oscillator tube (V18) from its socket to disable the high voltage.

VIDEO IF ALIGNMENT

Remove the converter tube (V2) from its socket and replace with a 6J6 which has Pin 1 removed. This will disable the local oscillator and reduce the possibility of erroneous indications.
Connect the negative lead of a 3 volt bias supply to the ungrounded side of C48. Connect the positive lead to chassis.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	High side to an ungrounded tube shield floating over dummy coverter tube. Low side to chassis.	27.25MC (Unmod)	Any	DC probe to point (A). Common to chassis.	A1	Adjust for MINIMUM deflection.
2.	"	"	21.1MC	"	"	A2	"
3.	"	"	21.25MC	"	"	A3	"
4.	"	"	25.5MC	"	"	A4	Adjust for maximum deflection. Attenuate generator output to maintain not more than -1.5 volts on VTVM.
5.	"	"	22.0MC	"	"	A5	"
6.	"	"	23.0MC	"	"	A6	"
7.	"	"	24.5MC	"	"	A7	"
8.	"	"	23.7MC	"	"	A8	"

OVERALL VIDEO IF RESPONSE CHECK

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9.	Direct	High side to an ungrounded tube shield floating over dummy converter tube. Low side to chassis.	24MC (10MC Swp)	21.1MC 21.25MC 22.0MC 23.7MC 25.75MC 27.25MC	Any	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.		Check for response similar to Fig. 1. Adjust A9 until dip in response curve is centered about the 23.7MC marker. If necessary, retouch A4 thru A8 to obtain desired response.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
10.	.01MFD	High side to pin 2 (grid) of 12AU7 (V7). Low side to chassis.	4.5MC (Unmod)	Any	DC probe to point (B). Common to chassis.	A10, A11, A12	Adjust for maximum deflection.
11.	"	"	"	"	DC probe to point (C). Common to point (D).	A13	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60% modulation and 450KC sweep. Use 120% sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.	.01MFD	High side to pin 2 (grid) of 12AU7 (V7). Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any	Vert. Amp. thru 10KΩ to point (B). Low side to chassis.	A10, A11, A12	Disconnect stabilizing capacitor C6. Adjust for curve of maximum amplitude and symmetry similar to Fig. 2.
11.	"	"	"	"	"	Vert. Amp. thru 10KΩ to point (C). Low side to chassis.	A13	Reconnect stabilizing capacitor C6. Adjust so that 4.5MC occurs at center of cross-over lines as in Fig. 3. SLIGHTLY retouch A12 for maximum amplitude and straightness of crossover lines.

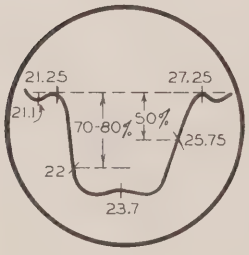


FIG.1

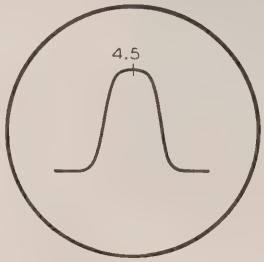


FIG.2

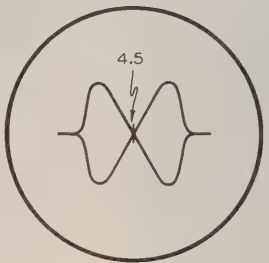


FIG.3

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ALIGNMENT INSTRUCTIONS (cont)

OSCILLATOR ALIGNMENT

Remove the dummy converter tube and replace the original 6J6 in its socket. Leave the bias connected as under "Video IF alignment."
The channel oscillator adjustment screws are reached through a hole just to the right of the channel switch shaft. The correct adjustment screw is accessible through this hole as the channel switch is turned to each channel.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
12.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	207MC (10MC Swp)	205.25MC 209.75MC	12	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.	A14	Adjust to place sound marker in trap notch as in Fig. 4. Video marker should be at 50%.
			213MC (10MC Swp)	211.25MC 215.75MC	13		A15	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A16	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A17	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A18	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A19	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A20	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A21	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A22	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A23	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A24	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A25	

RF AND MIXER ALIGNMENT

Leave the bias connected as under "Video IF alignment".
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
13.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	207MC (10MC Swp)	205.25MC 209.75MC	12	Vert. Amp. to point (E). Low side to chassis.	A26 A27 A28	Adjust for response curve similar to Fig. 5 with markers above 90%.
14.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		If markers fall below 70% on any channel make compromise adjustment of A26, A27 and A28 with channel switch set to that channel, then check all other channels to see that they have not been seriously affected.
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
			85MC (10MC Swp)	83.25MC 87.75MC	6			
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

4.5MC TRAP ALIGNMENT

Turn the set on and turn the fine tuning control counter clockwise until 4.5MC beat interference appears in the picture.
Adjust A29 for MINIMUM 4.5MC beat interference.

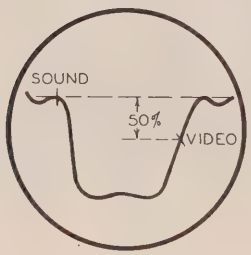


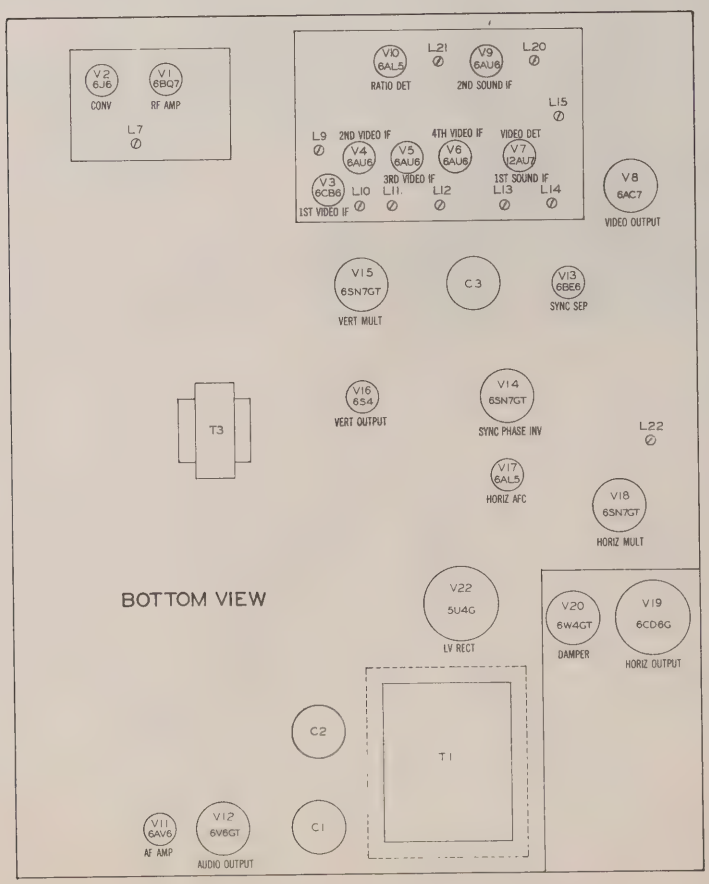
FIG.4

FIG.5

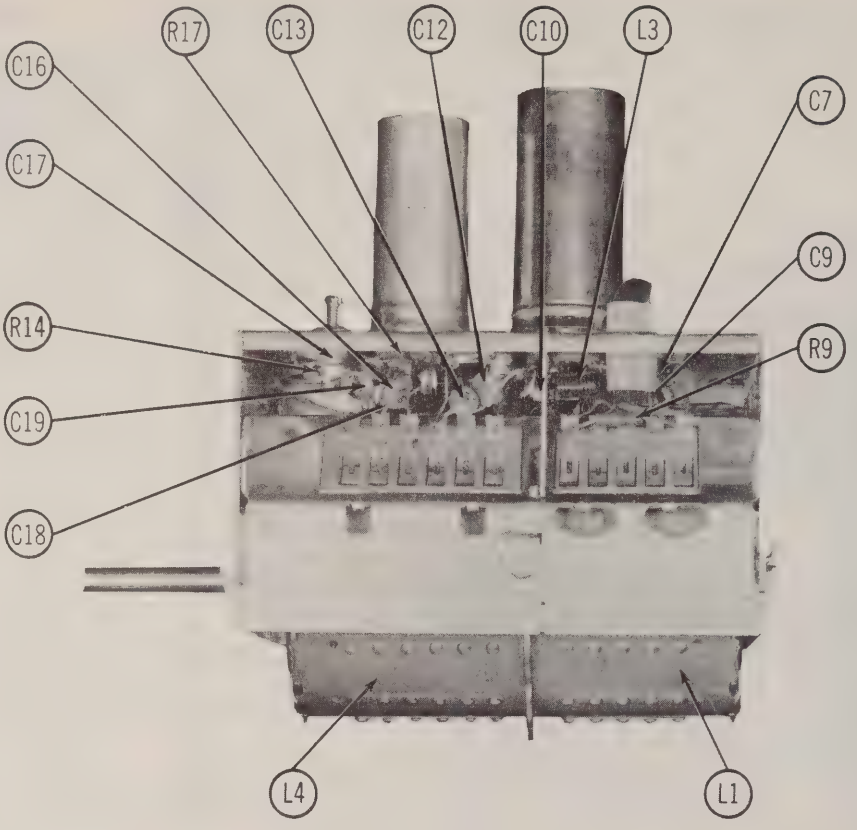
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BQ7A	INF	700KΩ	0Ω	.1Ω	0Ω	†1.6KΩ	115KΩ	INF	0Ω
V 2	6J6	†23KΩ	†23KΩ	.1Ω	0Ω	230KΩ	10KΩ	0Ω		
V 3	6CB6	950KΩ	51Ω	.1Ω	0Ω	†3.2KΩ	†3.2KΩ	0Ω		
V 4	6AU6	960KΩ	0Ω	.1Ω	0Ω	†3.1KΩ	†3.1KΩ	68Ω		
V 5	6AU6	960KΩ	0Ω	.1Ω	0Ω	†7.6KΩ	†2.9KΩ	68Ω		
V 6	6AU5	.5Ω	0Ω	.1Ω	0Ω	†8.3KΩ	†2.7KΩ	150Ω		
V 7	12AU7	†3.6KΩ	100KΩ	150Ω	.1Ω	.1Ω	470KΩ	5.7KΩ	.5Ω	0Ω
V 8	6AC7	0Ω	0Ω	0Ω	4.7KΩ	55Ω	†23KΩ	.1Ω	†5.7KΩ	
V 9	6AU6	470KΩ	0Ω	.1Ω	0Ω	†15KΩ	†15KΩ	0Ω		
V 10	6AL5	INF	INF	0Ω	.1Ω	0Ω	0Ω	20KΩ		
V 11	6AV6	10Meg	0Ω	.1Ω	0Ω	0Ω	0Ω	†220KΩ		
V 12	6V6GT	0Ω	0Ω	†3.1KΩ	†2.6KΩ	470KΩ	INF	.1Ω	270Ω	
V 13	6BE6	52KΩ	0Ω	.1Ω	0Ω	90KΩ	†41KΩ	2.7Meg		
V 14	6SN7GT	0Ω	0Ω	0Ω	2.2Meg	†5.8KΩ	6.6KΩ	.1Ω	0Ω	
V 15	6SN7GT	60KΩ	▲325KΩ	1.8KΩ	440KΩ	▲2.6Meg	1.8KΩ	.1Ω	0Ω	
V 16	6S4	INF	3.3KΩ	1Meg	0Ω	.1Ω	1Meg	3.3KΩ	INF	▲4KΩ
V 17	6AL5	INF	INF	.1Ω	0Ω	47KΩ	0Ω	47KΩ		
V 18	6SN7GT	INF	†10.7KΩ	1.5KΩ	230KΩ	†190KΩ	1.5KΩ	.1Ω	0Ω	
V 19	6CD6G	INF	0Ω	300Ω	INF	470KΩ	INF	.1Ω	†18KΩ	TOP CAP ▲19Ω
V 20	6W4GT	INF	INF	280KΩ	INF	†85Ω	INF	▲28Ω	▲28Ω	
V 21	1B3GT	PINS		1 - 8	HAVE	INF	RESISTANCE			TOP CAP ▲480Ω
V 22	5U4G	INF	18KΩ	INF	27Ω	INF	28Ω	INF	18KΩ	
V 23	21EP4B	0Ω	†240KΩ	PIN 10 ▲185KΩ	PIN 11 †220KΩ	PIN 12 .1Ω				

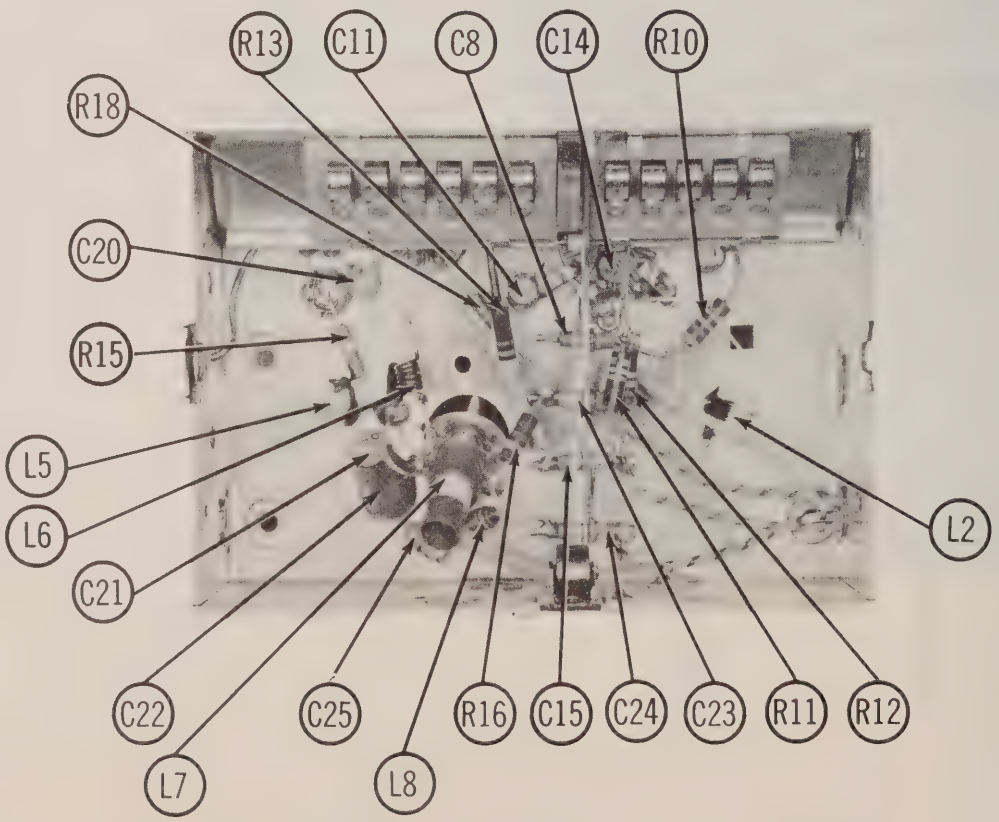
† MEASURED FROM PIN 2 OF V22
▲ MEASURED FROM PIN 3 OF V20



TUBE PLACEMENT CHART



RF TUNER-RIGHT SIDE



RF TUNER-BOTTOM VIEW

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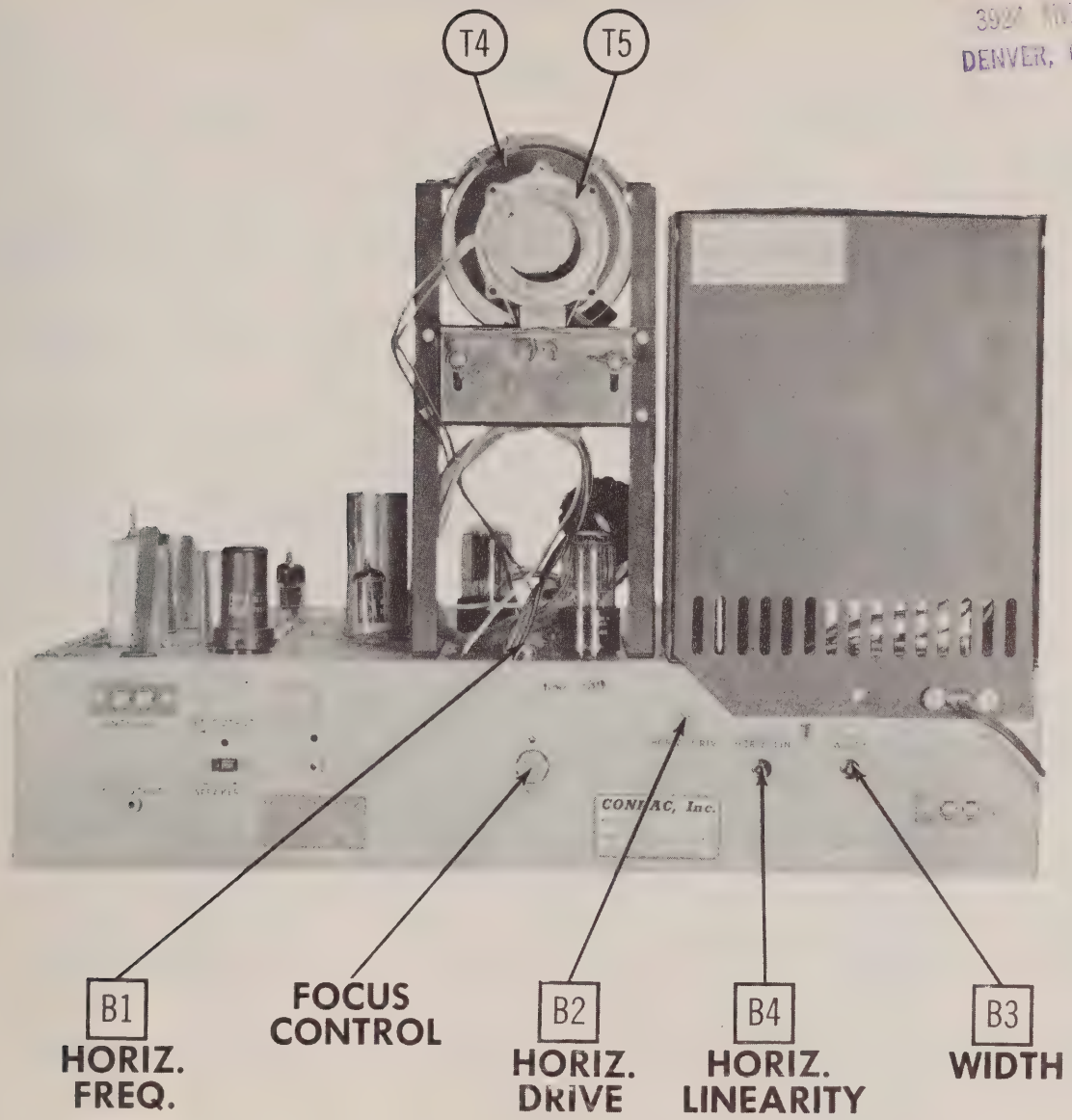

CHASSIS—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.

Set the horizontal hold control to its mid-range position. Ground pin 1 (grid) of the horizontal multivibrator (V18) to chassis. Adjust the horizontal oscillator slug (B1) until the picture is almost in sync. Remove short from pin 1 of V18. Check pull-in by switching off channel and back again. If necessary, retouch B1 for proper pull-in action.

Turn the horizontal drive trimmer (B2) clockwsie as far as possible without the presence of vertical white lines or compression near the center of the picture or without having the picture fall out of sync horizontally.

Adjust the width slug (B3) for a picture that is slightly wider than necessary to fill the picture mask horizontally.

Adjust the horizontal linearity slug (B4) for a picture that is symmetrical from left to right.

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage.

INSUFFICIENT SWEEP

Check adjustments B2, B3, B4. Check by substitution V18, V19, V20 and V22. Check waveform W14.

If Satisfactory	If Unsatisfactory
Check T2, T4A, T6, T7, C93, R103, R102 and other associated components.	Check C88, C89, C87, R99, C86 and other associated components.

DRIVE LINES

Check adjustments B2, B3 and B4. Check by substitution V18, V19 and V20. Check T2, T4A, C90, C91, R106 and other associated components.

COMPRESSED LEFT SIDE

Check adjustments B2, B3 and B4. Check by substitution V19, V20 and V21. Check components associated with the horizontal output and damper stages especially T2 and T4A.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check C83 for open. Check V18, V19, T2, T4A, and T6 for internal arcing.

XMAS TREE EFFECT

Substitute V18. Check adjustments B1, B2, B3 and B4. Check L22, C2B, C84, C85 and other associated components.

VERTICAL

LOSS OF SWEEP

Check by substitution V14 and V15. Check waveform W8.

If Satisfactory	If Unsatisfactory
Check T3, T4B, R106 and other associated components.	Check C75, C74, C72, C71, R76, R78, R75, R4 and other associated circuit components.

INSUFFICIENT SWEEP

Check adjustment of height and vertical linearity controls. Proceed as outlined under "Loss of Sweep".

COMPRESSED AT BOTTOM

Check by substitution V14 and V15. Check T3, T4B, C71 and other associated circuit components.

COMPRESSED AT TOP

Check by substitution V14 and V15. Check R5, R81, R79, C5, T3 and other associated circuit components.

FOLDS

Check by substitution V14 and V15. Check associated components for failure or change of value.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Substitute V13 and V16. Check C66, C69, C68, R72, R69 and other associated circuit components.

LOSS OF VERTICAL SYNC - HORIZONTAL SYNC SATISFACTORY

Check by substitution V14. Check waveform W6.

If Satisfactory	If Unsatisfactory
Check components associated with V14, especially C71, R75, and R6.	Check vertical integrator network. Check the video and IF stages for overloading.

LOSS OF HORIZONTAL SYNC - VERTICAL SYNC SATISFACTORY

Check by substitution V17 and V18. Check waveform W13.

If Satisfactory	If Unsatisfactory
Check for open R3 and R96.	Check C78, C82, R92, R90, R91, R94 and other associated components.

HORIZONTAL BENDING

Check by substitution V13, V16, V17 and V18. Check horizontal AFC filter network for component failure or change of value.

VIDEO

LOSS OF VIDEO

Substitute V8. Check components associated with V8. Check picture tube.

SOUND BARS (4.5MC BEAT)

Adjust tuner fine tuning for best sound and picture. Check adjustment A29 and video IF alignment.

POOR CONTRAST

Substitute V8. Check video detector stages. Check contrast control, picture tube and other associated circuit components.

NEGATIVE PICTURE

Check by substitution V3, V4, V5, V6, V7A and V8. Check AGC network. Check picture tube.

SMEAR

Substitute V8 and V7A. Check L14, L17, R46, C51, picture tube and other associated components.

WIDE BLACK BAR ACROSS PICTURE

Check V3, V4, V5, V6, V7A and V8 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V7B, V9, V10, V11 and V12. Check detector switch on rear of chassis to see if in TV position. Check stages V11 and V12 using audio signal generator. Apply audio signal across R1.

If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF alignment and components.	Check C63, C64, C65, R62, R65 and other associated circuit components.

BUZZ

Adjust tuner fine tuning for best picture and sound. Adjust A13 for minimum buzz. If still unsatisfactory, substitute V10 and realign ratio detector and audio IF stages.

DISTORTED

Follow procedure outlined under "Weak or No Sound".

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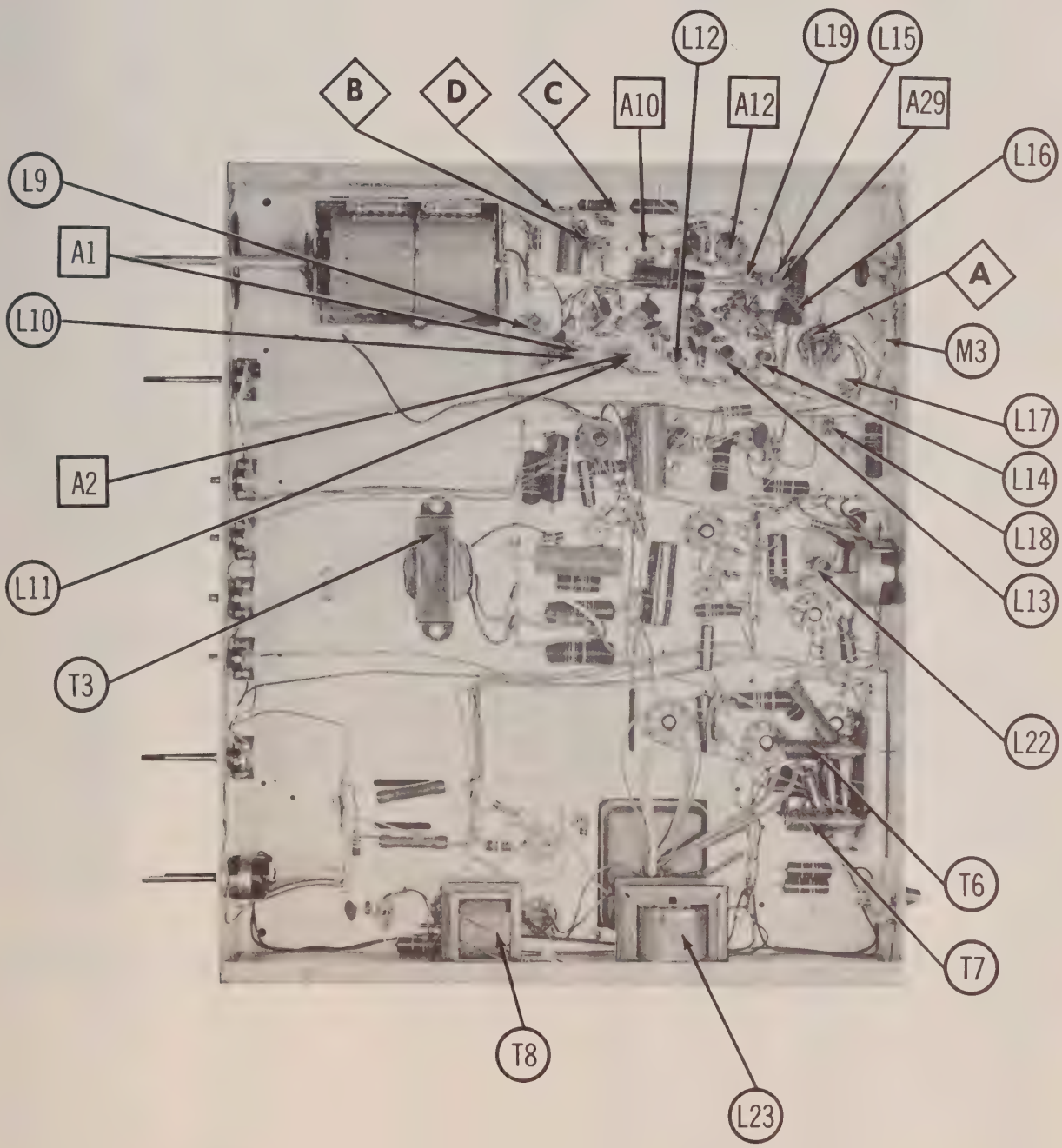

FLEETWOOD
MODEL 610

CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

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DENVER, COLORADO

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: FLEETWOOD PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	RF Amplifier	6BQ7	6BQ7	9AJ	
V2	Converter	6J8	6J8	7BF	
V3	1st. Video IF Amp.	6CB6	6CB6	7CM	
V4	2nd. Video IF Amp.	6AU6	6AU6	7BK	
V5	3rd. Video IF Amp.	6AU6	6AU6	7BK	
V6	4th. Video IF Amp.	6AU6	6AU6	7BK	
V7	Video Det.- AGC Rectifier- Sound IF Amp.	12AU7	12AU7	9A	
V8	Video Output	6AC7	6AC7	8N	
V9	Limiter	6AU6	6AU6	7BK	
V10	Ratio Detector	6AL5	6AL5	6BT	
V11	AF Amplifier	6AV6	6AV6	7BT	
V12	Audio Output	6V6GT	6V6GT	7S	
V13	Sync Separator	6BH6	6BH6	7CH	
V14	Sync Phase Inv.	6SN7GT	6SN7GT	8BD	
V15	Vert. Mult	6SN7GT	6SN7GT	8BD	
V16	Vert. Output	6S4	6S4	8AC	
V17	Horiz. AFC	6AL5	6AL5	6BT	
V18	Horiz. Mult.	6SN7GT	6SN7GT	8BD	
V19	Horiz. Output	6CD6G	6CD6G	5BT	
V20	Damper	6W6GT	6W6GT	6CG	
V21	HV Rectifier	1B3GT	1B3GT	3C	
V22	LV Rectifier	5U4G	5U4G	5T	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA: FLEETWOOD PART No.	CBS-HYTRON PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.	RETMA BASE TYPE	NOTES
V23	21EP4B	21EP4B 21EP4A 21EP4 ①	21EP4B	21EP4A	21KP4A 21KP4B	12N 12N 12D	① Circuit changes necessary

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: FLEETWOOD PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C1A	▲40	475		AFH2-72		BO53		FP263	TVL-2830	
B	▲40	475								
C2A	▲30	450		AFH4-87		D052		FP444	TVL-4763	
B	▲20	450								
C	▲30	450								
D	20	25								
C3A	30	450		AFH4-14		D013		FP444	TVL-4763	
B	▲20	450								
C	▲20	450								
D	▲30	450								
C4	20	450		PRS450/20		BR2045		TC75	TVA-1709	
C5	100	50		PRS50/100		BRH501		TC3501	TVA-1310	
C6	5	50		PRS10/4		BR550		TC30	TVA-1303	
C7	3-8				S29-10					
C8	1000			EF-001	MFT-1000				503C-D1	
C9	3			S13.5NP0	TC2-3.3	Z006	NP0K-030	Z7-5533	5TCCB-V33	
C10	1000			EF-001	MFT-1000				503C-D1	
C11	.5-3				S29-3		3115-01-GR5	CT595A	5TCCB-V5	
C12	1.5			S1L.5NP0	TC2-1.5	Z004	NP0K-1R5	Z7-5515	5TCCB-V15	
C13	15			S1S1		C035	GP1K-510			
C14	1500			EPD-0015	DD-152	K071	801-0015	DC-5315	5HK-D15	
C15	1000			EF-001	MFT-1000				503C-D1	
C16	510			S1S1		Q035	GP1K-510			
C17	.5-3				S29-3		3115-01-GR5	CT595A	5TCCB-V5	
C18	10			S10NP0	TC2-10	Z018	NP0K-100	Z7-561	5TCC-Q1	
C19	5									
C20	1500			EPD-0015	DD-152	K071	801-0015	DC-5315	5HK-D15	
C21	6.8			S1S.5NP0	TC2-6.8	Z013	NP0K-6R8	Z7-5558	5TCCB-V68	
C22	73									
C23	1000			EF-001	MFT-1000				503C-D1	
C24	1000			EF-001	MFT-1000				503C-D1	
C25	300			S1300		D6-301	GP2K-301	UC-535	5GA-T3	
C26	47	200		PZ66-47			CUBP247	PT6247	2TM-P47	
C27	5000			EPD-005	DD-502	K080	801-005	DC-535	5HK-D5	
C28	5000			EPD-005	DD-502	K080	801-005	DC-535	5HK-D5	
C29	5000			EPD-005	DD-502	K080	801-005	DC-535	5HK-D5	
C30	75			S1T5N750	TCN-75	TN05	NT50L-750	NT-5475	5TCU-Q75	
C31	330			S1330	D6-331	TP43	GP3K-331	UC-5533	5GA-T33	
C32	5000			EPD-005	DD-502	K080	801-005	DC-535	5HK-D5	
C33	5000			EPD-005	DD-502	K080	801-005	DC-535	5HK-D5	
C34	5000			EPD-005	DD-502	K080	801-005*	DC-535	5HK-D5	
C35	68			S1S8NP0	TC2-68	T268	NP0K-680	Z7-5468	5TCC-Q68	
C36	330			S1330	D6-331	TP43	GP3K-331	UC-5333	5GA-T33	
C37	5000			EPD-005	DD-502	K080	801-005	DC-535	5HK-D5	
C38	5000			EPD-005	DD-502	K080	801-005	DC-535	5HK-D5	
C39	5000			EPD-005	DD-502	K080	801-005	DC-535	5HK-D5	
C40	330			S1330	D6-331	TP43	GP3K-331	UC-5333	5GA-T33	
C41	5000			EPD-005	DD-502	K080	801-005	DC-535	5HK-D5	
C42	5000			EPD-005	DD-502	K080	801-005	DC-535	5HK-D5	
C43	5000			EPD-005	DD-502	K080	801-005	DC-535	5HK-D5	
C44	100			S1100NP0	TC2-100	T210	NP0-333-101	Z7-531	5TCC-T1	
C45	330			S1330	D6-331	TP43	GP3K-331	UC-5333	5GA-T33	
C46	5000			EPD-005	DD-502	K080	801-005	DC-535	5HK-D5	
C47	56			S1S6	D6-560	TP31	GP1K-560	UC-5456	5GA-Q56	
C48	.22	400		P46B-22		CUB4P22		PT4022	4TM-P22	
C49	5									Note 1
C50	500			S1500	D6-501	TP47	GP2K-501	UC-535	5GA-T5	
C51	56			S1S6NP0	TC2-56	TZ24	NP0K-560	Z7-5458	5TCC-Q56	Note 2
C52	56			S1S6NP0	TC2-56	TZ24	NP0K-560	Z7-5468	5TCC-Q56	
C53	.047	600		P68B-047	DF-503	CUB6S47		PT6147	6TM-S47	
C54	.1	600		P68B-1	DF-104	CUB6P1		PT601	6TM-P1	
C55	.56			S1S6	D6-560	TP31	GP1K-560	UC-5456	5GA-Q56	

PARTS LIST AND DESCRIPTIONS

CAPACITORS (cont)

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: FLEETWOOD PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C56	5000			BPD-005	DD-502	K080	81L-005	DC-525	5HK-D5	
C57	1000			EI000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	
C58	5000			BPD-005	DD-502	K080	81L-005	DC-525	5HK-D5	
C59	5000			BPD-005	DD-502	K080	81L-005	DC-525	5HK-D5	
C60	500			S1500	D6-501	TP47	GP2K-501	UC-535	5GA-T5	
C61	.0047	600		P68B-0047	D6-472	CUB6D47	GP2-333-472	PT6247	6TM-D47	
C62	.012	600		P68B-012	DF-303	CUB6S23	817-02	PT6123	6TM-S22	
C63	5000			BPD-005	DD-502	K080	81L-005	DC-525	5HK-D5	
C64	820			P68B-023	DF-203	CUB6S23	817-02	PT6123	6TM-S22	
C65	.0047	600		P68B-0047	D6-472	CUB6D47	GP2-333-472	PT6247	6TM-D47	Note 3
C66	.0068	600		P68B-0068	D6-682	CUB6D68	GP2-333-682	PT6268	6TM-D68	Note 4
C67	220	500		168-00025	D6-221	SW5T22	GP2K-221	MC240	1FM-S25	
C68	1000			BPD-01	DD-103	K082	81L-01	DC-511	5HK-01	
C69	.047	600		P68B-047	DF-503	CUB6S47		PT6147	6TM-S47	
C70A	.01					K062	81L-01	DC-511	5HK-01	
B	.002		♦	♦PA-111	♦PC-101	K072	81L-002	DC-532	5HK-2	
C	.005					K080	81L-005	DC-525		
D	.008					K090	81L-008	DC-535		
C71	.016	600		P68B-015		CUB6S15		PT615	6TM-S15	
C72	.0068	600		P68B-0068	D6-682	CUB6D68	GP2-333-682	PT6268	6TM-D68	Note 4
C73	.047	600		686-25		CUB6P25		PT6025	6TM-P25	
C74	.047	600		P68B-047	DF-503	CUB6S47		PT6147	6TM-S47	
C75	.1	600		P68B-1	DF-104	CUB6P1		PT601	6TM-P1	
C76	.022	500		P68B-022	DF-303	CUB6S22	817-03	PT6122	6TM-S22	
C77	500	500		1468-0006		SR5T5		MC8245	MS-35	
C78	500	500		1468-0005		SR5T5		MC8245	MS-35	
C79	.0068	600		P68B-0068	D6-682	CUB6D68	GP2-333-682	PT6268	6TM-D68	Note 4
C80	.01	600		P68B-01	D6-103	CUB6S1	GP2-333-103	PT611	6TM-S1	
C81	.01	600		P68B-01	D6-103	CUB6S1	GP2-333-103	PT611	6TM-S1	
C82	5000			BPD-005	DD-502	K080	81L-005	DC-525	5HK-D5	
C83	.047	600		P68B-047	DF-503	CUB6S47		PT6147	6TM-S47	
C84	5800	500		1464-007		SR3D7		MC8468	MS-37	
C85	270	500		1469-0003		SR5T27		MC8241	MS-33	
C86	47	500		1469-00006		12R5Q47		MC8225	MS-45	
C87	.01	600		P68B-01	D6-103	CUB6S1	GP2-333-103	PT611	6TM-S1	
C88	.1	600		P68B-1	DF-104	CUB6P1		PT601	6TM-P1	
C89	.47	200		PZ68-47		CUB4P47		PT4047	4TM-P47	
C90	.047	600		P68B-047		CUB6S47		PT6147	6TM-S47	
C91	.047	600		P68B-047		CUB6S47		PT6147	6TM-S47	
C92	.1	600		P68B-1	DF-104	CUB6P1		PT601	6TM-P1	
C93	500	25000		HV500	TV3-502	MMU20T5	413	HV20035A	20DK-T5	
C94	47	1000		HVD15-00005		VQ47	IR SKY-470	MCL467	10GA-Q47	
C95	.032	600		P68B-022		CUB6S22		PT6122	6TM-S22	
C96	.022	600		P68B-022		CUB6S22		PT6122	6TM-S22	

Note 1. Some models use 5.6MMF in this application.
Note 2. Some models use 47MMF in this application.
Note 3. Some models use .004MFD in this application.
Note 4. Some models use .006MFD in this application.
♦ Items C70A, C70B, C70C, C70D, R74A, R74B, R74C, R74D are combined in one unit.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: FLEETWOOD PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500KΩ	½	730R201	Q15-133	A47-500K-Z	AB-50	U-48	Volume
B	Shaft		Not Req.	Not Req.	FS-3	AK-3	Not Req.	Attach to R1A
C	Switch		Not Req.	Not Req.	SWZ-13	KB-1	UB-26	Attach to R1A
R2A	500KΩ	½	460-R18	Q11-133	A47-500K-S	B-59	U-50	Brightness
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R2A
R3A	1MΩ	½	460-R104	Q11-134	A47-100K-S	AB-40	SU-41	Horiz. Hold
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R3A
R4A	2 Meg	½	460-R310	Q11-139	A47-2 Meg-S	AB-75	SU-56	Height
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R4A
R5A	3000Ω	2	460-R71	WK-3000	A43-3000	VK-133	R3000L	Vert. Linearity
B	Shaft		Not Req.	Not Req.	FKS-1/4	Not Req.	Not Req.	Attach to R5A
R6A	250KΩ	½	460-R69	Q11-130	A47-250K-S	AB-50	SU-46	Vert. Hold
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R6A
R7A	1000Ω	½	460-R401	Q11-108	A47-1000-S	B-5	U-44	Contrast
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R7A
R8A	3000Ω	4	4WR-3000	4WR-3000	A10-3000	31P-393	M3MP	Focus - Note
B	Shaft		Not Req.	Not Req.	FKS-1/4	Not Req.	Not Req.	Attach to R8A

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: FLEETWOOD PART No.	IRC PART No.	NOTES
R9	15KΩ	½		BTS-15K	
R10	47KΩ	½		BTS-47K	
R11	2.70KΩ	½		BTS-270K	
R12	180KΩ	½		BTS-180K	
R13	470Ω	½		BTS-470	
R14	10KΩ	½		BTS-10K	
R15	220KΩ	½		BTS-220K	
R16	15KΩ	½		BTS-15K	
R17	10KΩ	½		BTS-10K	
R18	15KΩ	½		BTS-15K	
R19	22 Meg	½		BTS-22 Meg	
R20	180KΩ	½		BTS-180K	
R21	8800Ω	1		BTA-8800	
R22	3300Ω 5%	1		BTS-3300 5%	
R23	1000Ω	1		BTS-1000	
R24	5Ω 5%	1		BTS-5 1 5%	
R25	150Ω	1		BTS-150	
R26	10KΩ 5%	1		BTS-10K 5%	
R27	68Ω 5%	1		BTS-68 5%	
R28	150Ω	1		BTS-150	
R29	1000Ω	1		BTS-1000	
R30	390Ω	1		BTS-390	
R31	10KΩ 5%	1		BTS-10K 5%	
R32	68Ω 5%	1		BTS-68 5%	
R33	4700Ω 5%	1		BTS-4700 5%	
R34	150Ω	1		BTS-150	
R35	1000Ω	1		BTS-1000	
R36	150Ω	1		BTS-150	
R37	5600Ω 5%	1		BTA-5600 5%	

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: FLEETWOOD PART No.	IRC PART No.	NOTES
R39	150Ω	½		BTS-150	
R39	470KΩ	½		BTS-470K	
R40	470KΩ	½		BTS-470K	
R41	1000Ω	½		BTS-1000	
R42	820Ω	½		BTS-820	
R43	22KΩ	1		BTA-22K	
R44	4700Ω 5%	1			
R45	22KΩ	½		BTS-22K	
R46	330KΩ	½		BTS-330K	
R47	330KΩ	½		BTS-330K	
R48	100KΩ	½		BTS-100K	
R49	100KΩ	½		BTS-100K	Note 4
R50	150Ω	½		BTS-150	
R51	100KΩ	½		BTS-100K	
R52	1000Ω	½		BTS-1000	
R53	4700Ω	½		BTS-4700	
R54	470KΩ	½		BTS-470K	
R55	22KΩ	½		BTS-22K	
R56	15KΩ	1		BTA-15K	
R57	51Ω 5%	1		BTA-51 5%	
R58	15KΩ	½		BTS-15K	
R59	10KΩ	½		BTS-10K	
R60	10KΩ	½		BTS-10K	
R61	10 Meg	½		BTS-10 Meg	
R62	220KΩ	½		BTS-220K	
R63	1.2 Meg	½		BTS-1.2 Meg	
R64	470KΩ	½		BTS-470K	
R65	270Ω	½		BTS-270	
R66	1000Ω	2		BTB-1000	

RESISTORS (cont)

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: FLEETWOOD PART No.	IRC PART No.	NOTES
R67	47KΩ	½		BTS-47K	
R68	1 Meg	½		BTS-1 Meg	
R69	39KΩ	½		BTS-39K	
R70	470KΩ	½		BTS-470K	
R71	2.2 Meg	½		BTS-2.2 Meg	
R72	390KΩ	½		BTS-390K	
R73	100KΩ	½		BTS-100K	
R74A	22KΩ	1		BTS-22K	
B	22KΩ	½		BTS-22K	
C	8200Ω	½		BTS-8200	
D	8200Ω	½		BTS-8200	
R75	1800Ω	½		BTS-1800	
R76	240KΩ 5%	1		BTA-240K 5%	Note 1
R77	220KΩ	½		BTS-220K	
R78	2 Meg	½		BTS-1.2 Meg	
R79	15KΩ	½		BTS-15K	
R80	1 Meg	½		BTS-1 Meg	
R81	220KΩ	1		BTA-220K	Note 2
R82	82KΩ	½		BTS-82K	
R83	56KΩ	½		BTS-560	
R84	56KΩ	½		BTS-560	
R85	1000Ω	½		BTS-1000	
R86	2.2 Meg	½		BTS-2.2 Meg	
R87	3900Ω	½		BTS-3900	
R88	2700Ω	½		BTS-2700	
R89	4700Ω	½		BTS-4700	
R90	100KΩ	½		BTS-100K	

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: FLEETWOOD PART No.	IRC PART No.	NOTES
R91	100KΩ	½		BTS-100K	
R92	470KΩ	½		BTS-470K	
R93	47KΩ	½		BTS-47K	
R94	1500Ω 5%	½		BTS-1500 5%	
R95	5800Ω 5%	½		BTS-5800 5%	
R96	180KΩ	½		BTS-180K	
R97	180KΩ	½		BTS-180K	
R98	5600Ω	½		BTS-5600	Note 6
R99	47000Ω 5%	½		BTS-47000 5%	
R100	470KΩ	½		BTS-470K	
R101	150Ω	½		BTS-150	
R102	300Ω	10		1 3/4A-300	
R103	18KΩ	10			
R104	47KΩ	½		BTS-47K	
R105	22KΩ	½		BTS-22K	
R106	2200Ω	½		BTS-2200	
R107	3.8Ω	1			
R108	82KΩ	½		BTA-82K	
R109	82KΩ	½		BTA-82K	
R110	33KΩ	½		BTA-33K	
R111	350Ω	10		1 3/4A-1500	
R112	1500Ω	10		1 3/4A-1500	
R113	30Ω	½		BTS-30	
R114	100KΩ	½		BTS-100K	
R115	470KΩ	½		BTS-470K	
R116	3.8Ω	1			Note 3
R117	47Ω	1		BTA-470	Note 5

♦ Items R74A, R74B, R74C, R74D, C70A, C70B, C70D are combined in one unit.
Note 1. Some models may use a 250KΩ resistor in this application.
Note 2. Some models may use a 200KΩ resistor in this application.
Note 3. Not used in all models.
Note 4. Some models may use a 470KΩ resistor in this application.
Note 5. Some models may use a 10KΩ resistor in this application.
Note 6. Not used in models using an electrostatic focus picture tube.

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	REPLACEMENT DATA: FLEETWOOD PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	RCA TYPE No	Halldorson PART No.	Thordarson PART No.
T1	117VAC ② 1.86A	642VCT ③ 250MDC	5VAC ④ 2.3A	650350	P-6338 ⑤	P-3053 ⑫	B49BC ⑥			
	SEC. 3	SEC. 4	SEC. 5							
	6.3VAC ⑦ 1.2A	6.3VAC ⑧ 1.2A								

① Use low taps on high voltage taps only.
② Parallel and phase 6.3V 7A for Sec. # 4.
③ Drill new mounting holes.
④ Parallel and phase 5.3V 9A and 6.3V .9A windings for Sec. # 4.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA: FLEETWOOD PART No	Stancor PART No	Merit PART No *	Triad PART No	RCA TYPE No	Halldorson PART No	Thordarson PART No
T2	Horiz. Output Trans.	T41	A-8127 & A-8128	HV0-9 *	D-19 *	2307T *	FB41 *	FLY-14 *
T3	Vert. Output Trans.		A-8141	A-3039	A-104X	2267T	Z1806	Z8H54
T4A	Yoke-Horiz. (18MH)	DY-11A	MDF-73	Y-22-1	222D1	DF805	Y-10	
B	Vert. (38MH)							
T5	Focus Coil	⑪						
T6	Horiz. Linearity 0.5-9.3MH		WC-6 ⑨	WC-12 ⑩	212R1	RF800 ⑬	WC-17	
T7	Width (2.6-18MH)		WC-6	WC-12 ⑩	212R1		WC-18 ⑨	

① Enlarge mounting hole.
② Connect to coded red and blue terminals.
③ Use secondary.
④ Not used in models using a electrostatic focus picture tube.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

ORIGINAL TERMINAL CONNECTIONS	Stancor Replacement Connections	Merit Replacement Connections	Triad Replacement Connections	RCA Replacement Connections	Halldorson Replacement Connections	Thordarson Replacement Connections
9	7	9	9	9	8	8
8	4	8	8 & 7	8	8	8 & 7
7	7	7	5	7	7	5
5(NC)	NC	NC	NC	NC	NC	NC
4	7	6	4	4	4	4
T	T	T	T	T	T	T
3	3	3	3	3	2	3
1	1	1	1	1	1	1
Connect Width Coil Across	3 & 1	Pri. of WC-5 across 3 & 1	3 & 1	3 & 1	3 & 1	3 & 1
Special Notes		⑪				

① Remove original width coil from circuit and connect original terminal "T" to coded terminal orange of WC-5. Connect coded black terminal to ground. If picture is out of phase, reverse black and orange terminals.

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	FLEETWOOD PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	
T8	7. 8KΩ	3 to 4Ω	2073	A-8114 ①	A-3020	S-8X ①	Z1113 ①	TS-24S52	① Drill one new mounting hole.

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	FLEETWOOD PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Ant. Coils	0ΩCT	0Ω					
L2	Fil. Choke	0Ω						
L3	Neutr. Coil	0Ω						
L4	RF, Mixer grid & osc. coils	0Ω						
L5	Fil. Choke	0Ω						
L6	RF Choke	0Ω						
L7	Conv. Plate	. 6Ω						
L8	IF Trap	. 4Ω						
L9	1st Video IF	. 2Ω			17-1004	TV-103 †	6189 †	
L10	2nd Video IF	. 1Ω					6245	Includes trap
L11	3rd Video IF	. 4Ω					6246 ▲	Includes trap
L12	4th Video IF	. 5Ω			17-1004	TV-103 †	6189 †	
L13	Cathode Trap	0Ω	0Ω		20-1021 †	TV-150 †	6193 †	
L14	5th Video IF	. 5Ω			17-1003	TV-102 †	6188 †	
L15	4. 5MC Trap	1. 4Ω			20-1004	TV-151	1470	
L16	Series Peak. Coil	10Ω			19-3125		6153	132 Microhenries
L17	Series Peak. Coil	13Ω			19-4200	TV-185 *	6154 *	215 Microhenries; wound on 18KΩ resistor
L18	Shunt Peaking Coil	18Ω			19-3500	TV-188	6174	450 Microhenries
L19	RF Choke	11Ω			19-3250	TV-185	6181	250 Microhenries
L20	Sound IF	. 8Ω	1. 8Ω	XM-726	16-3445	TV-113 ♦	6203 ♦	
L21	Ratio Det.	5. 5Ω	1. 8ΩCT	2645-3	17-3497	TV-115	6205	Tertiary winding=. 6Ω
L22	Horiz. Osc.	33Ω			19-1575	TV-163 †	6210 †	

† Enlarge mounting hole.
* Parallel with 18KΩ resistor.
♦ Use adaptor plate.
▲ Add 3900Ω resistor across trap.

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA					
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ∿)	FLEETWOOD PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
L23	. 250	74. 5Ω	2. 88HY	520-L301	C-2334 ①	C-2991	C-17X ①	C5030	20C55

① Drill one new mounting hole.

MISCELLANEOUS

ITEM No.	PART NAME	FLEETWOOD PART No.	NOTES
M1	Dial light		# 44 bayonet
M2	Tuner		
M3	Switch		TV-phono (detector output)
M4	Ion trap		
B2	Trimmer cap		Horiz. Drive

TROUBLE SHOOTING AIDS (cont)

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

POWER

DEAD SET

If filaments fail to light, check AC interlock assembly and switch on volume control. If filaments light, check V22. Check B+ filter and decoupling network components for failure or change of value.

SMALL AND/OR DIM PICTURE

Substitute V22. Check B+ filter and decoupling network components.

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V18, V19, V20 and V21. Check waveform W14.

If Satisfactory	If Unsatisfactory
Check T2, T4A, T6, T7, C90, C91, C88, R103, R106 and other associated circuit components.	Check C87, C85, C86, R97, R98, R102 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V18, V19, V20, V21 and V22. Check picture tube. Proceed as outlined under "Loss of High Voltage".

BLOOMING

Check by substitution V18, V19, V20, V21 and V22. Check R108, T2, T4A, picture tube and other associated components.

GENERAL

RASTER - SOUND -NO PICTURE

Follow procedure outlined under "Loss of Video".

RASTER-PICTURE - NO SOUND

Follow procedure outlined under "Weak or No Sound".

RASTER-NO SOUND-NO PICTURE

Check by substitution V1, V2, V3, V4, V5, V6, V7 and V8. Check tuner, video and IF components.

NO RASTER - NO SOUND

Follow procedure outlined under "Dead Set".

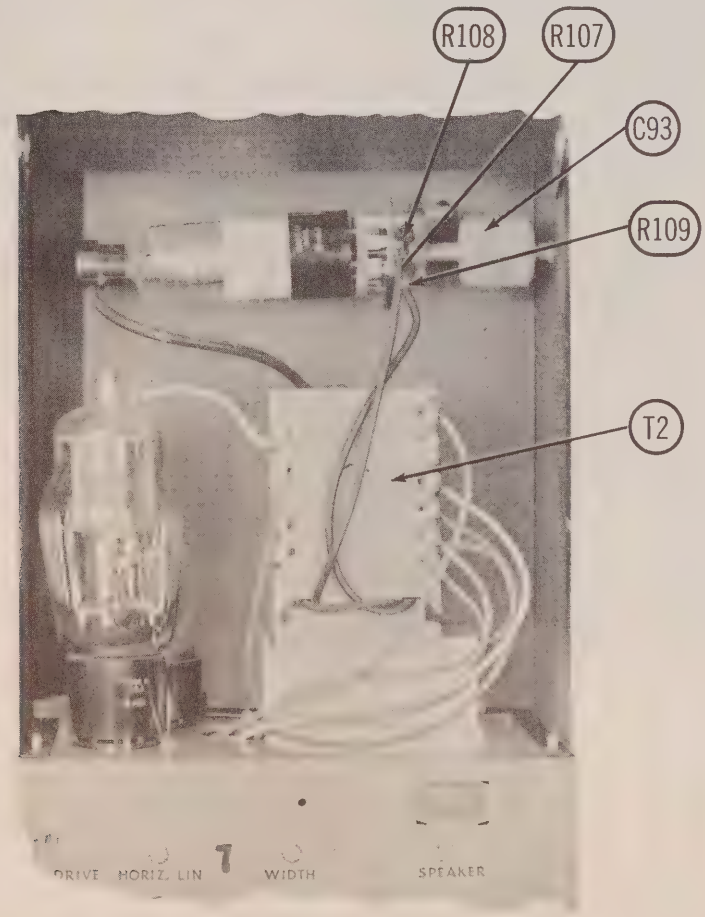
KEYSTONE EFFECT

Check T4, C92 and R106.

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.

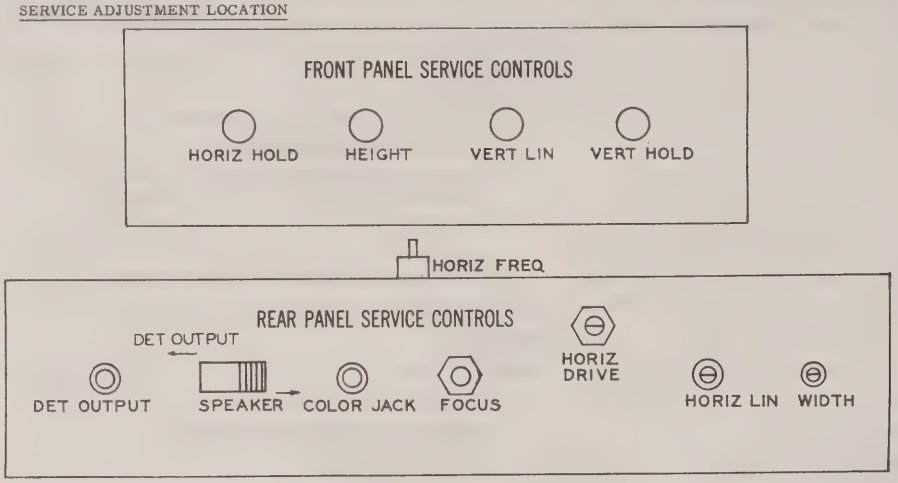


HIGH VOLTAGE COMPARTMENT

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removal of the channel selector and fine tuning knobs. The adjustments are accessible, one at a time, thru the small hole in the cabinet to the right of the channel selector shaft.

SERVICE ADJUSTMENT LOCATION



HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

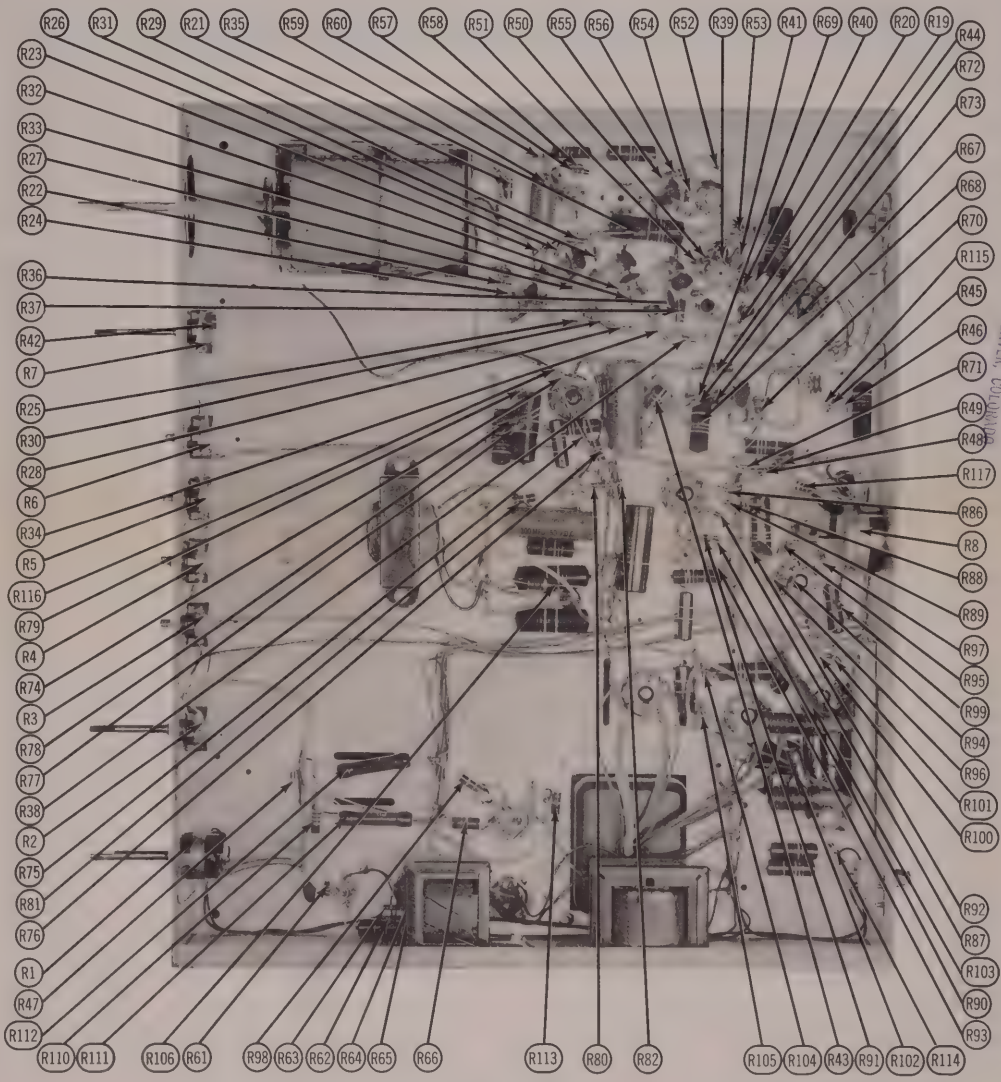
For adjustment of the horizontal oscillator, it is necessary to remove the rear cover and supply power to set. Adjustment is located on top of chassis. Set the horizontal hold control at the center of its range and adjust the horizontal frequency slug(L22) until picture synchronizes horizontally. (For location see tube placement chart).

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary (L21) located on top of chassis. (See tube placement chart).

CENTERING

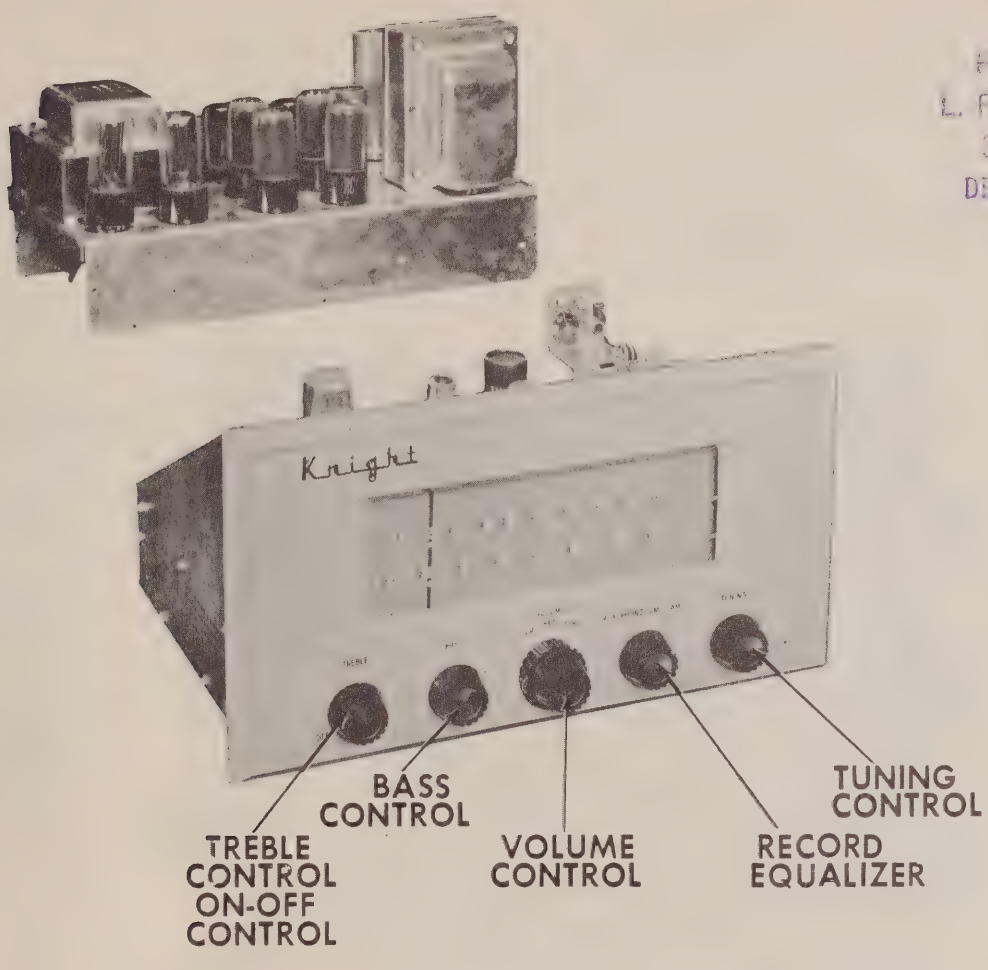
Centering is accomplished mechanically by positioning the focus magnet. The focus magnet is mounted on a shelf with one wing nut and is adjustable laterally. The shelf itself is supported by two wing nuts and is adjustable vertically. These adjustments permit the picture to be properly centered.



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

PROPERTY OF
L. F. MARKENSHIP
[illegible] ST.
DENVER, COLORADO

KNIGHT
MODEL SX19L720



KNIGHT
MODEL SX19L720

TRADE NAME	Knight Model SX19L720
SUPPLIER	Allied Radio Corp., 100 N. Western Ave., Chicago 80, Ill.
TYPE SET	AM-FM Superheterodyne Tuner With Separate Audio & Power Supply Chassis
TUBES	Nineteen
POWER SUPPLY	105-125 Volts AC-50/60 Cycles RATING 1.35 Amp.
TUNING RANGE - BROADCAST	535KC-1720KC FREQ. MOD. 88-108MC

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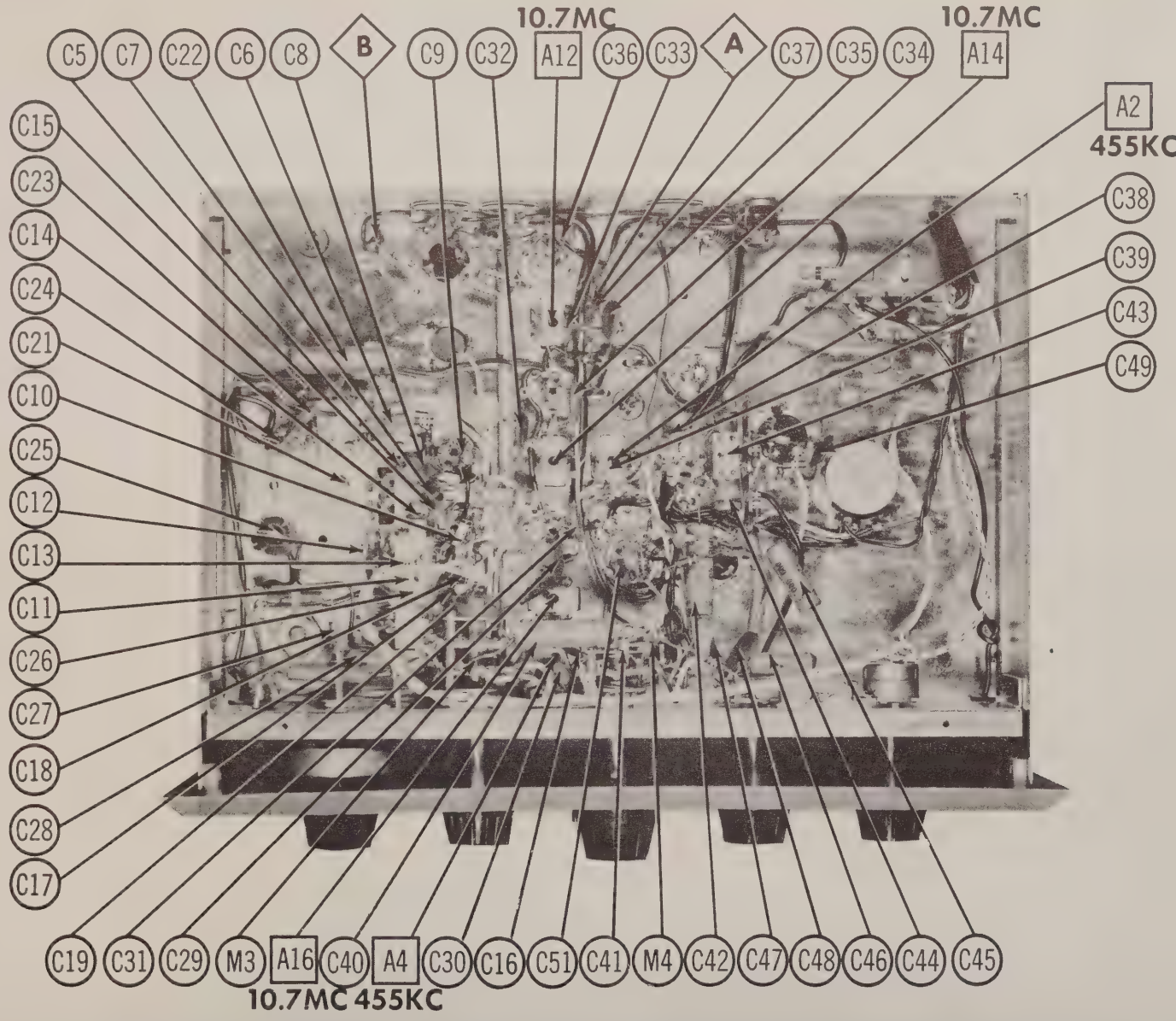
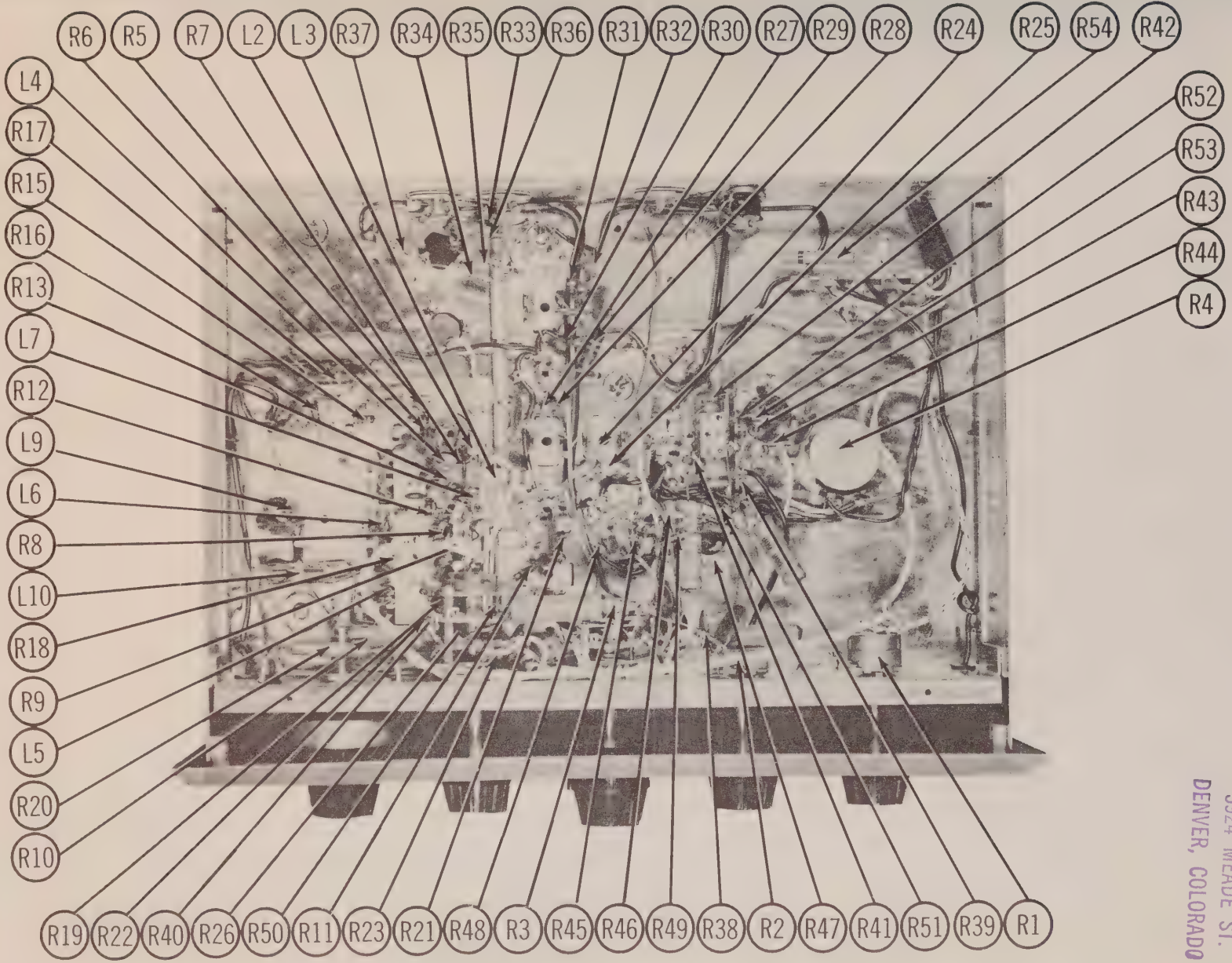
"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1954 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America



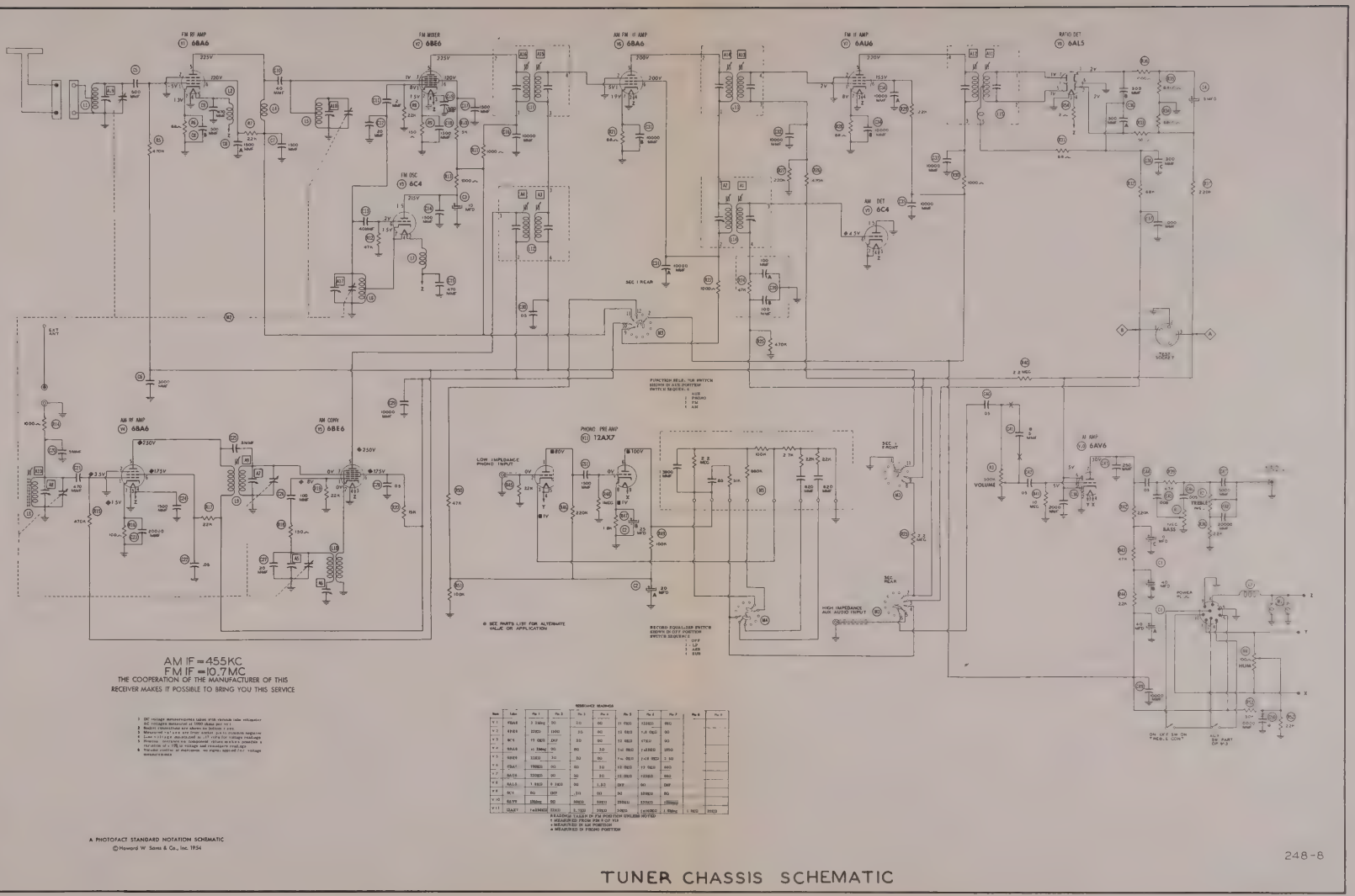
TUNER CHASSIS-BOTTOM VIEW-CAPACITOR IDENT.



TUNER CHASSIS-BOTTOM VIEW-RESISTOR IDENT.

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

KNIGHT
MODEL SX19L720


AM IF = 455KC
FM IF = 10.7MC
THE COOPERATION OF THE MANUFACTURER OF THIS
RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W. Sams & Co., Inc. 1954
248-8
TUNER CHASSIS SCHEMATIC

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Speaker and amplifier should be connected for normal operation throughout entier alignment procedure.
With tuning gang fully closed set pointer to the last index mark (small gold line) to the left of "55" on the dial.
Allow a 15 minute warm-up period for receiver and test equipment.
Set treble and base controls to maximum clockwise position.
Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

AM ALIGNMENT

Attenuate signal generator output to maintain 0.5 watt indication (approximately 1.4 volts across 4Ω speaker terminal and 2 volts across 8Ω speaker terminals).

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.01MFD	High side to pin 1 (grid) of 6BA6 (V6). Low side to chassis.	455KC (400∿Mod)	AM	Tuning gang fully open	Across voice coil	A1, A2	Adjust for maximum deflection.
2.	"	High side to pin 7 (grid) of 6BE6 (V5). Low side to chassis.	"	"	"	"	A3, A4	"
3.	5MMF	High side to AM antenna input socket. Low side to chassis.	1700KC	"	1700KC	"	A5	"
4.	"	"	550KC	"	550KC	"	A6	Adjust for maximum deflection. Repeat steps 3 and 4 until correct oscillator tracking is obtained.
5.	"	"	1550KC	"	Tune to 1500KC signal	"	A7, A8	Adjust for maximum deflection.
6.	"	"	600KC	"	Tune to 600KC signal	"	A9, A10	Adjust for maximum deflection. Repeat steps 5 and 6 until correct RF tracking is obtained.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
7.	.01MFD	High side to Pin 1 (grid)of 6AU6 (V7). Low side to chassis.	10.7MC (Unmod)	FM	Point of non-interference	DC probe to point Ⓐ. Common to chassis.	A11	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
8.	"	"	"	"	"	DC probe to point Ⓑ. Common to chassis.	A12	Adjust for maximum deflection. Repeat step 7 and 8.
9.	"	High side to pin 1 (grid) of 6BA6 (V6). Low side to pin 7.	"	"	"	"	A13,A14	Attenuate generator output to maintain -1.5 volts at VTVM. Adjust for maximum deflection.
10.	"	High side to pin 7 (grid) of 6BE6 (V5). Low side to chassis.	"	"	"	"	A15,A16	"

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
7.	.01MFD	High side to pin 7 (grid) of 6BE6 (V5). Low side to chassis.	10.7MC (450KC Swp)	FM	Point of non-interference	Vert. Amp. to point Ⓑ. Low side to chassis.	A12, A13, A14, A15, A16	Disconnect stabilizing capacitor C4. Adjust for curve of maximum amplitude and symmetry similar to Fig. 1.
8.	"	"	"	"	"	Vert. Amp. to point Ⓐ. Low side to chassis.	A11	Reconnect stabilizing capacitor C4. Adjust so that 10.7MC occurs at center of crossover lines as in Fig. 2. SLIGHTLY retouch A12 for maximum amplitude and straightness of crossover lines. Continue alignment with step 11.

FM RF ALIGNMENT

Attenuate signal generator output to maintain -1.5 volts at VTVM.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
11.	270Ω Carbon Resistor	Across FM antenna input socket (270Ω in high side)	106MC (Unmod)	FM	108MC	DC probe to point Ⓑ. Common to chassis.	A17	Adjust for maximum deflection.
12.	"	"	88MC	"	88MC	"		Use tuning wand to check L6. If necessary, adjust for maximum deflection by compressing or expanding coil turns. Repeat steps 11 and 12 until correct oscillator tracking is obtained.
13.	"	"	106MC	"	106MC	"	A18, A19	Adjust for maximum deflection.
14.	"	"	90MC	"	90MC	"		Use tuning wand to check L5 and L1. If necessary, adjust L5 and L1 for maximum deflection by compressing or expanding coil turns. Repeat steps 13 and 14 until correct RF tracking is obtained.

HUM BALANCE ADJUSTMENT

Allow tuner to warm-up for at least 10 minutes with record player disconnected and perform the following operations.

(a) Set function switch to "phono" position.
(b) Set volume control fully clockwise.
(c) Set record equalizer to "AES" position.
(d) Reverse AC line plug and leave position that gives LEAST HUM.
(e) Adjust hum balance control (R4A) for MINIMUM background noise and residual hum.

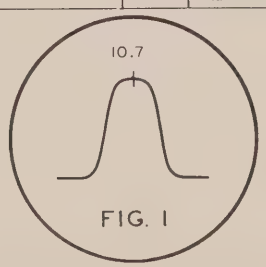


FIG. 1

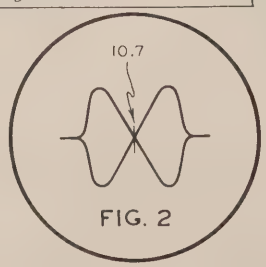


FIG. 2

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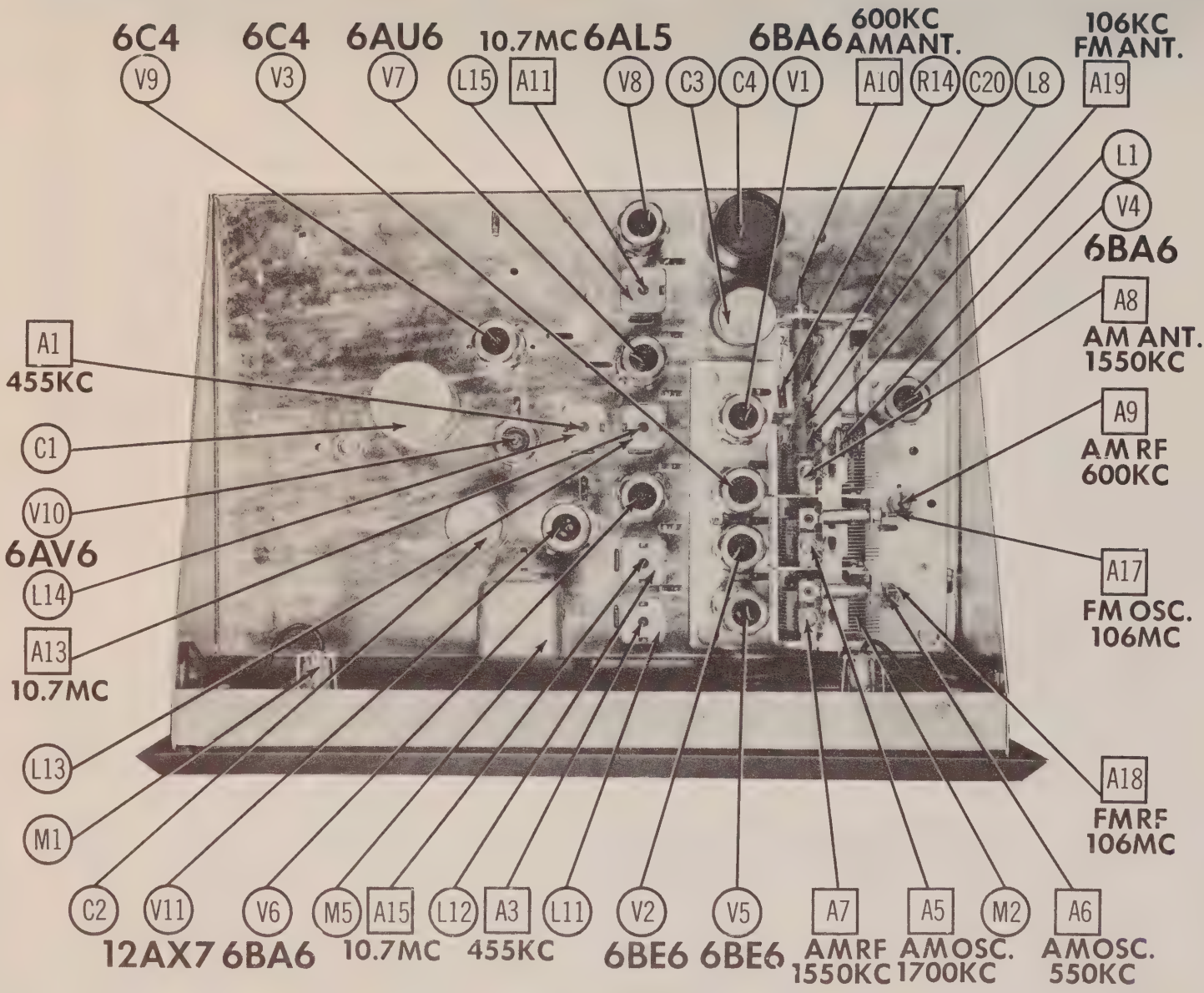
3924 MEADE ST.
DENVER, COLORADO



TUNER CHASSIS–TOP VIEW

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

KNIGHT
MODEL SK19L720

PARTS LIST AND DESCRIPTIONS — TUNER CH.

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: KNIGHT PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	FM RF Amplifier	6BA6	6BA6	7BK	
V2	FM Mixer	6BE6	6BE6	7CH	
V3	FM Oscillator	6C4	6C4	6BG	
V4	AM RF Amplifier	6BA6	6BA6	7BK	
V5	AM Converter	6BE6	6BE6	7CH	
V6	1st. AM FM IF Amp	6BA6	6BA6	7BK	
V7	2nd. FM IF Amp.	6AU6	6AU6	7BK	
V8	Ratio Detector	6AL5	6AL5	6BT	
V9	AM Detector	6C4	6C4	6BG	
V10	AF Amplifier	6AV6	6AV6	7BT	
V11	Phono Pre-Amp.	12AX7	12AX7	9A	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	KNIGHT PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C1A	▰40	450		AFH3-43		C034		FP376.8	TVL-3785	
B	■40	450								
C	▲10	450								
C2A	■20	450		AFH3-36		B050		FP234	TVL-3749	
B	▲25	50						TC30		
C3	10	450		AFH1-48		A043		FP143	TVL-1705	
C4	5	250		PRS250/4		BR425		TC50X	TVA-1501	
C5	1500			BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C6	3000			SI3000	D6-302	TP60	GP2-333-302	UC-523	5HK-D3	
C7	1500			BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C8A	1500			BPD-2X0015	DD2-152	DK071	812-0015	DCD-5215	5HK-2D15	
B	1500									
C9	470			BPD-00047	D6-471	K060	801-471	UC-5347	5GA-T47	
C10	40									
C11	2									
C12	20									
C13	40									
C14	1500			BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C15	470			BPD-00047	D6-471	K060	801-471	UC-5347	5GA-T47	
C16	10000			BPD-01	DD-103	K080	811-01	DC-511	5HK-S1	
C17	1500			BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C18	1500			BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C19	1500			BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C20	5			SI5NP0	TCZ-4.7	TZ07	NP0K-050	ZT-555	5TCCB-V47	
C21	470			BPD-00047	D6-471	K060	801-471	UC-5347	5GA-T47	
C22	.05	400		P488-05	DF-503	CUB4S5		PT415	4TM-S5	
C23	20000			BPD-02	DF-203	K085	817-02		5HK-S2	
C24	1500			BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C25	5			SI5NP0	TCZ-4.7	TZ07	NP0K-050	ZT-555	5TCCB-V47	
C26	100			SI100NP0	TCZ-100	TZ30	NP0-333-101	ZT-531	5TCC-T1	
C27	20			SI20NP0	TCZ-20	TZ13	NP0K-200	ZT-542	5TCC-Q2	
C28	.05	400		P488-05	DF-503	CUB4S5		PT415	4TM-S5	
C29	10000			BPD-01	DD-103	K080	811-01	DC-511	5HK-S1	
C30	.05	200		P288-05	DF-503	PJ2S5		PT415	2TM-S5	
C31A	10000			BPD-2X01	DD3-103	DK-082	811-01	DC-511	5HK-2S1	
B	10000						811-01			
C32	10000			BPD-01	DD-103	K080	811-01	DC-511	5HK-S1	
C33	10000			BPD-01	DD-103	K080	811-01	DC-511	5HK-S1	
C34A	10000			BPD-2X01	DD3-103	DK082	811-01	DC-511	5HK-S1	
B	10000						811-01	DC-511		
C35	10000			BPD-01	DD-103	K080	811-01	DC-511	5HK-S1	
C36A	300			SI300	D6-301	TP42	GP2K-301	UC-533	5GA-T3	
B	300			SI300	D6-301	TP42	GP2K-301	UC-533	5GA-T3	
C	300			SI300	D6-301	TP42	GP2K-301	UC-533	5GA-T3	
C37	1000			BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C38	2000			SI2000	D6-202	TP56	GP2-333-202	UC-522	5HK-D2	
C39A	100			♦PA-97	♦PC-50	♦111TM1	♦1403-01	UC-531	♦100C1	
B	100							UC-531		
C40	.05	200		P288-05	DF-503	PJ2S5		PT415	2TM-S5	
C41	51			SI50	D6-500	TP30	GP1K-500	UC-545	5GA-Q5	Note 1
C42	.05	200		P288-05	DF-503	PJ2S5		PT415	2TM-S5	

PARTS LIST (Continued) — TUNER CH.

CAPACITORS (cont)

ITEM No.	RATING CAP.	RATING VOLT	KNIGHT PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C43	250	500		1468-00025	D6-251	5W5T25	GP2K-251	MC240	1FM-325	
C44	.05	600		P688-05	DF-503	CUB6S5		PT615	6TM-S5	
C45	.006	600		P688-006	D6-602	CUB6D6	GP2-333-602	PT626	6TM-D6	
C46	.005	600		P688-005	D6-502	CUB6D5	GP2-333-502	PT625	6TM-D5	
C47	5000			BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C48	20000			BPD-02	DF-203	K085	817-02	PT412	5HK-S2	
C49	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C50	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	Note 1
C51	1500			BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	

Note 1. Not used in all models.
♦ Items C39A, C39B and R24 are combined in one unit.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	KNIGHT PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1 Meg	½	A9.317-A	Q13-137	A47-1Meg-Z	B-70-S	U-53	Treble
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWE-12	Not Req.	US-26	Attach to R1A
R2A	1 Meg	½	A9. 316-A	Q11-137	A47-1 Meg-S	B-69	U-54	Bass
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R2A
R3	500KΩ	½	A9. 311-A					Volume & switch
R4A	100Ω	½	A9. 310-A	W-100	A43-100	VK-121	R100L	Hum balance
B	Shaft		Not Req.	RQ	FKS-1/4	Not Req.	Not Req.	Attach to R4A

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	KNIGHT PART No.	IRC PART No.	NOTES
R5	470KΩ	½		BTS-470K	
R6	68Ω	½		BTS-68	
R7	22KΩ	1		BTA-22K	
R8	22KΩ	½		BTS-22K	
R9	150Ω	½		BTS-150	
R10	15KΩ	2		BTB-15K	
R11	1000Ω	½		BTS-1000	
R12	47KΩ	½		BTS-47K	
R13	1000Ω	½		BTS-1000	
R14	1000Ω	½		BTS-1000	
R15	470KΩ	½		BTS-470K	
R16	100Ω	½		BTS-100	
R17	22KΩ	1		BTA-22K	
R18	150Ω	½		BTS-150	
R19	22KΩ	½		BTS-22K	
R20	15KΩ	2		BTB-15K	
R21	68Ω	½		BTS-68	
R22	1000Ω	½		BTS-1000	
R23	2. 2 Meg	½		BTS-2. 2Meg	
R24	47KΩ	½	♦	BTS-47K	
R25	470KΩ	½		BTS-470K	
R26	470KΩ	½		BTS-470K	
R27	220KΩ	½		BTS-220K	
R28	68Ω	½		BTS-68	
R29	22KΩ	1		BTA-22K	

ITEM No.	RATING OHMS	RATING WATT	KNIGHT PART No.	IRC PART No.	NOTES
R30	1000Ω	½		BTS-1000	
R31	68Ω	½		BTS-68	
R32	68KΩ	½		BTS-68K	
R33	1500Ω	½		BTS-1500	
R34	6800Ω	½		BTS-6800	
R35	6800Ω	½		BTS-6800	
R36	1000Ω	½		BTS-1000	
R37	220KΩ	½		BTS-220K	
R38	22KΩ	½		BTS-22K	
R39	47KΩ	½		BTS-47K	
R40	2. 2 Meg	½		BTS-2. 2Meg	
R41	10 Meg	½		BTS-10 Meg	
R42	220KΩ	½		BTS-220K	
R43	47KΩ	½		BTS-47K	
R44	22KΩ	½		BTS-22K	
R45	22KΩ	½		BTS-22K	
R46	220KΩ	½		BTS-220K	
R47	1800Ω	½		BTS-1800	
R48	1 Meg	½		BTS-1 Meg	
R49	100KΩ	½		BTS-100K	
R50	47KΩ	½		BTS-47K	
R51	100KΩ	½		BTS-100K	
R52	22KΩ	½		BTS-22K	
R53	150KΩ	½		BTS-150K	
R54	2Ω	1			

♦ Items R24, C39A, C39B, are combined in one unit.

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	KNIGHT PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	FM Ant. Coil	0Ω (tapped)		A2.241				
L2	Fil. Choke	.4Ω		2.703	19-1001	TV-189	4604	1.5 Microhenries (IRC part #CLA)
L3	Fil. Choke	.1Ω		2.702	19-1001	TV-189	4604	1.5 Microhenries (IRC part # CL-1)

(CONT'D ON NEXT PAGE)

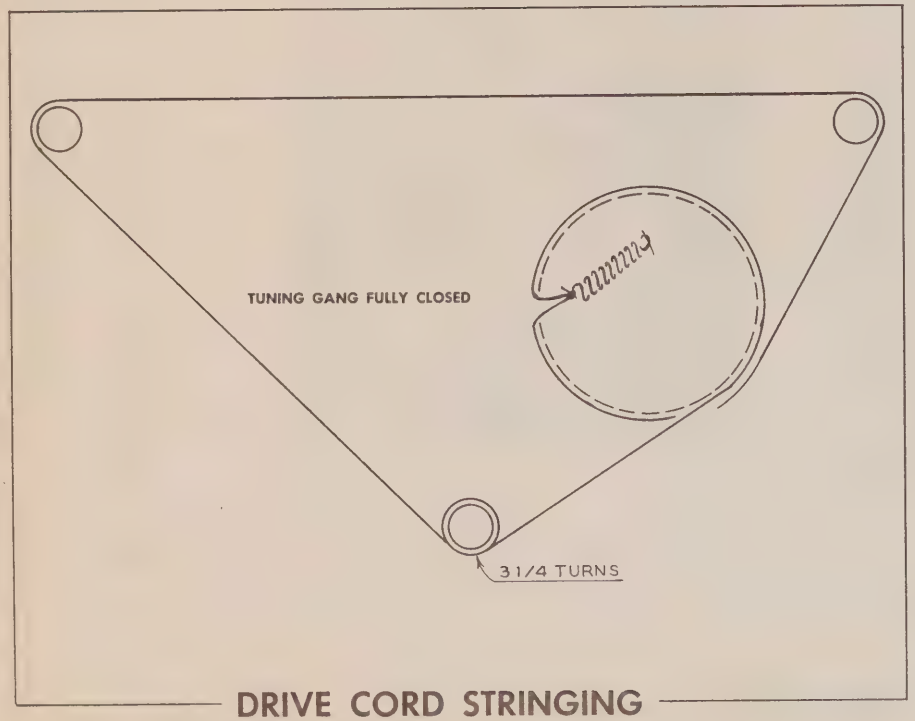
PARTS LIST (Continued)—TUNER CH.

COILS (cont)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: KNIGHT PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L4	FM RF Choke	1.1Ω		B2.402	19-1002		4606	3 Microhenries
L5	FM RF Coil	0Ω (tapped)		A2.580				
L6	FM Osc. Coil	0Ω (tapped)		A2.581				
L7	Fil. Choke	.4Ω		2.703	19-1001	TV-189	4604	1.5 Microhenries (IRC part #CLA)
L8	AM Ant. Coil	1.1Ω		2.699			6300	
L9	AM RF Coil	100Ω	2.4Ω	B2.409	14-1072	BC-382	A-5495-RF	
L10	AM Osc. Coil	.8Ω	7Ω	B2.410	14-1074	BC-397	70-Osc.	
L11	1st. FM IF	.7Ω	.7Ω	2.415	16-3487	FM-254	1463	
L12	1st. AM IF	9.5Ω	9.5Ω	2.414	16-6758	BC-352	12-C1	
L13	2nd. FM IF	.7Ω	.7Ω	2.415	16-3487	FM-254	1463	
L14	2nd. AM IF	9.5Ω	9.5Ω	2.414	16-6758	BC-353	12-C2	
L15	Ratio Det.	1.6Ω	10CT	2.474	17-3488 †	1465	FM-255	Tertiary winding -.5Ω

MISCELLANEOUS

ITEM No.	PART NAME	KNIGHT PART No.	NOTES
M1	Dial light		(2) # 47
M2	Tuning cap	B6.070	(28-515MMF) (39-525MMF) (33-512MMF)
M3	Switch		Function selector
M4	Switch		Record equalizer
M5	Network		Record equalizer
A6	Trimmer cap	C13.518	A. M. Osc. padder (500-100MMF)



DRIVE CORD STRINGING

PARTS LIST AND DESCRIPTIONS—POWER CH.

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: KNIGHT PART No.	STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V12	AF Amplifier	6J5	6J5	6Q	
V13	Phase Inverter	6J5	6J5	6Q	
V14	Audio Output	6V6GT	6V6GT	7S	
V15	Audio Output	6V6GT	6V6GT	7S	
V16	Audio Output	6V6GT	6V6GT	7S	
V17	Audio Output	6V6GT	6V6GT	7S	
V18	Rectifier	5Y3GT	5Y3GT	5T	
V19	Rectifier	5Y3GT	5Y3GT	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA: KNIGHT PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C52A	▲40	450		AFH3-43		C034		FP376.8	TVL-3785	
B	■40	450								
C	▲10	450								
C53A	▲10	450		AFH3-43		C034		FP376.8	TVL-3785	
B	■40	450								
C	▲40	450								
C54	50	50		AFH1-18		A020		FP115	TVL-1415	
C55A	■50	50		AFH2-06		B008		FP214	TVL-2320	
B	▲50	50								
C56	.05	400		P488-05	DF-503	CUB4S5		PT415	4TM-S5	
C57	.05	400		P488-05	DF-503	CUB4S5		PT415	4TM-S5	
C58	1500	1500		HVD15-0015			1R5KV-152	MCK215		
C59	1500	1500		HVD15-0015			1R5KV-152	MCK215		
C60	.05	400		489ZX-05		CUB4S5		PT415	4TM-S5	

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA: KNIGHT PART No.	IRC PART No.	NOTES
R55	470KΩ	½		BTS-470K	
R56	4700Ω	½		BTS-4700	
R57	10Ω	1			
R58	100Ω	½		BTS-100	
R59	47KΩ	½		BTS-47K	
R60	4700Ω	½		BTS-4700	
R61	220KΩ	½		BTS-220K	
R62	220KΩ	½		BTS-220K	
R63	47KΩ	½		BTS-47K	
R64	47KΩ	½		BTS-47K	
R65	39Ω	½		BTS-39	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA: KNIGHT PART No.	IRC PART No.	NOTES
R66	39Ω	½		BTS-39	
R67	180KΩ	½		BTS-180K	
R68	4000Ω	10	14.088		
R69	130Ω	10	14.089		
R70	39Ω	½		BTS-39	
R71	39Ω	½		BTS-39	
R72	220KΩ	½		BTS-220K	
R73	4000Ω	10	14.088		
R74	220Ω	10			
R75	730Ω	15			
R76	730Ω	15			

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	RATING SEC. 4	REPLACEMENT DATA: KNIGHT PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
T1	117VAC @ 1.35A.	610VCT .200ADC	5VAC @ 4A.	6.3VAC @ .59A.	6.3VAC 5.2A.	L18.128		P-3055			T-26R17

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA: KNIGHT PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	NOTES
T2	4.1KΩ CT	500Ω tap @ 250Ω, 15Ω, 8Ω, 4Ω	B15.037	A-5528①	A-3129①	S-22A		T-22S78①	① Drill new mounting holes, use shield on old transformer. ② This unit does not have 250Ω tap.

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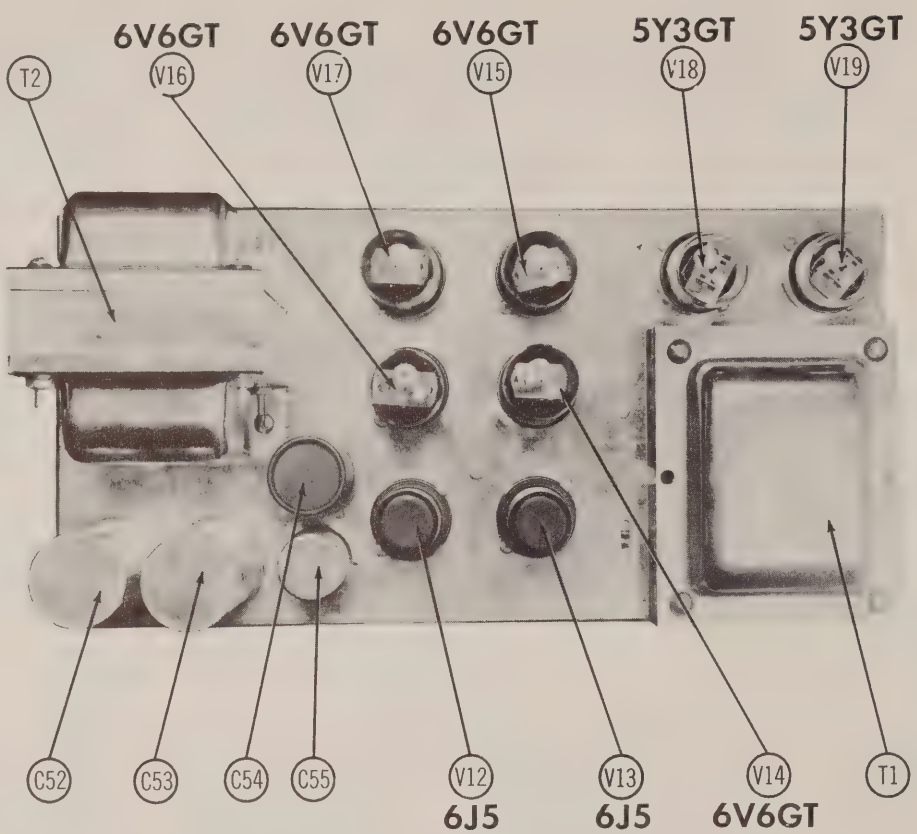
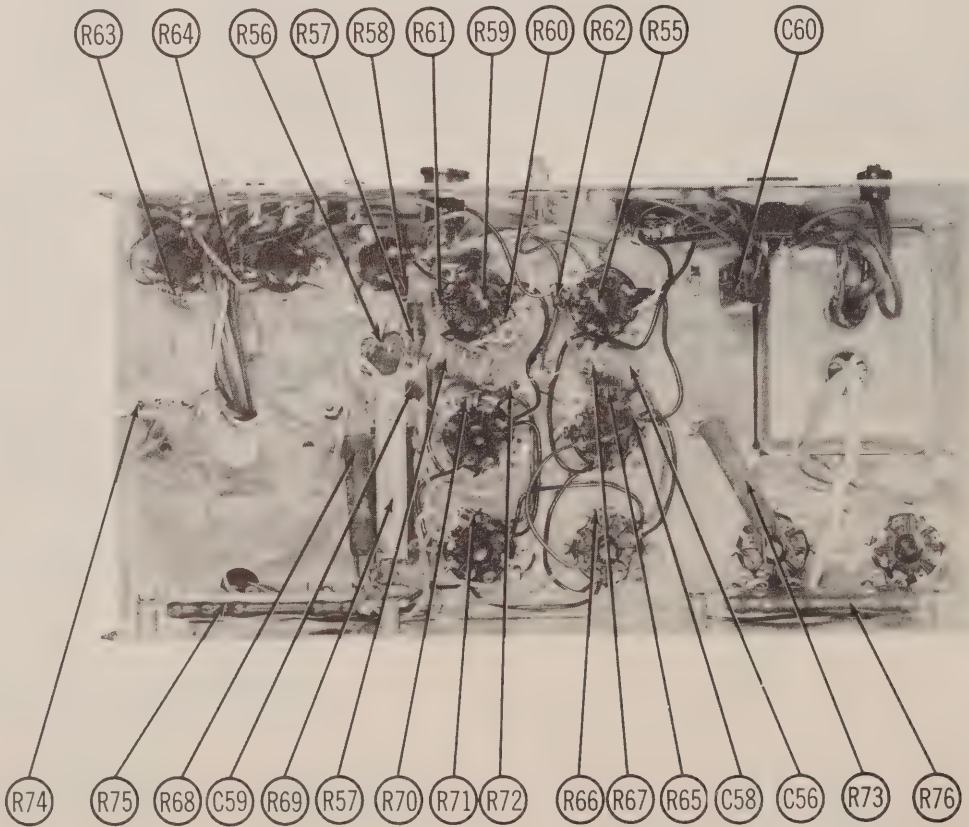
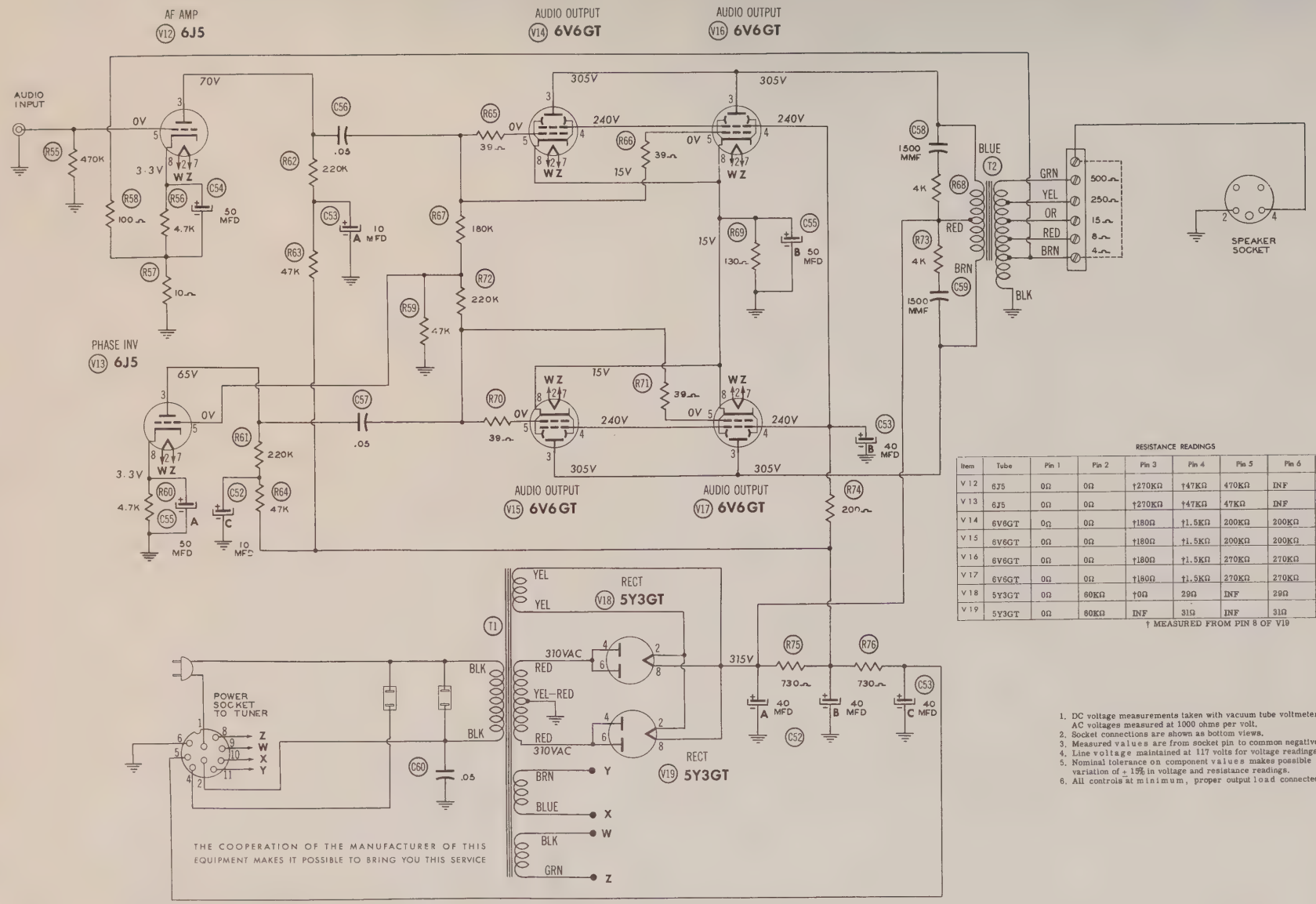


POWER CHASSIS–TOP VIEW



POWER CHASSIS–BOTTOM VIEW



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 12	6J5	0Ω	0Ω	†270KΩ	†47KΩ	470KΩ	INF	.2Ω	4.7KΩ
V 13	6J5	0Ω	0Ω	†270KΩ	†47KΩ	47KΩ	INF	.2Ω	4.7KΩ
V 14	6V6GT	0Ω	0Ω	†180Ω	†1.5KΩ	200KΩ	200KΩ	.2Ω	130Ω
V 15	6V6GT	0Ω	0Ω	†180Ω	†1.5KΩ	200KΩ	200KΩ	.2Ω	130Ω
V 16	6V6GT	0Ω	0Ω	†180Ω	†1.5KΩ	270KΩ	270KΩ	.2Ω	130Ω
V 17	6V6GT	0Ω	0Ω	†180Ω	†1.5KΩ	270KΩ	270KΩ	.2Ω	130Ω
V 18	5Y3GT	0Ω	60KΩ	†0Ω	29Ω	INF	29Ω	INF	60KΩ
V 19	5Y3GT	0Ω	60KΩ	INF	31Ω	INF	31Ω	INF	60KΩ

† MEASURED FROM PIN 8 OF V19

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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POWER CHASSIS SCHEMATIC

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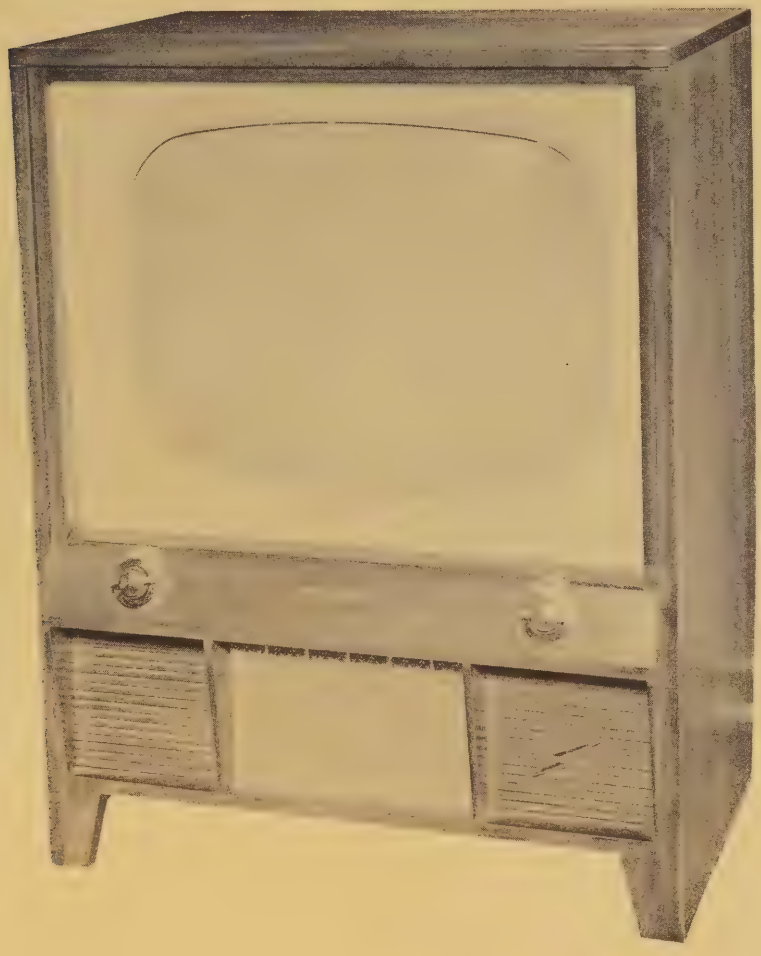

MODEL 336M

SYLVANIA MODELS 331, U,
336M, U (Ch. 1-513-1, -2, -3, -4)

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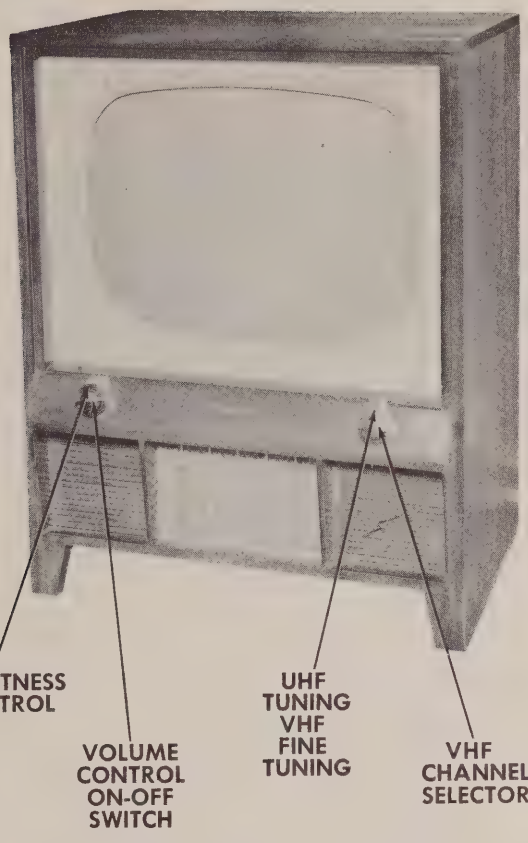
SYLVANIA MODELS 331, U, 336M, U (Ch. 1-513-1, -2, -3, -4)



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SYLVANIA MODELS 331, U, 336M, U (Ch. 1-513-1, -2, -3, -4)

SYLVANIA MODEL 336M

TRADE NAME	Sylvania Models 331, 336 Series (Ch. 1-513-1, -3) 331 "U", 336 "U" Series (Ch. 1-513-2, -4)
MANUFACTURER	Sylvania Electric Products, Inc., Radio & Television Div., 254 Rand St., Buffalo, N. Y.
TYPE SET	Television Receiver
TUBES	Thirty
POWER SUPPLY	110-120 Volts AC-60 cycle RATING 2.72 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC, (Intercarrier)

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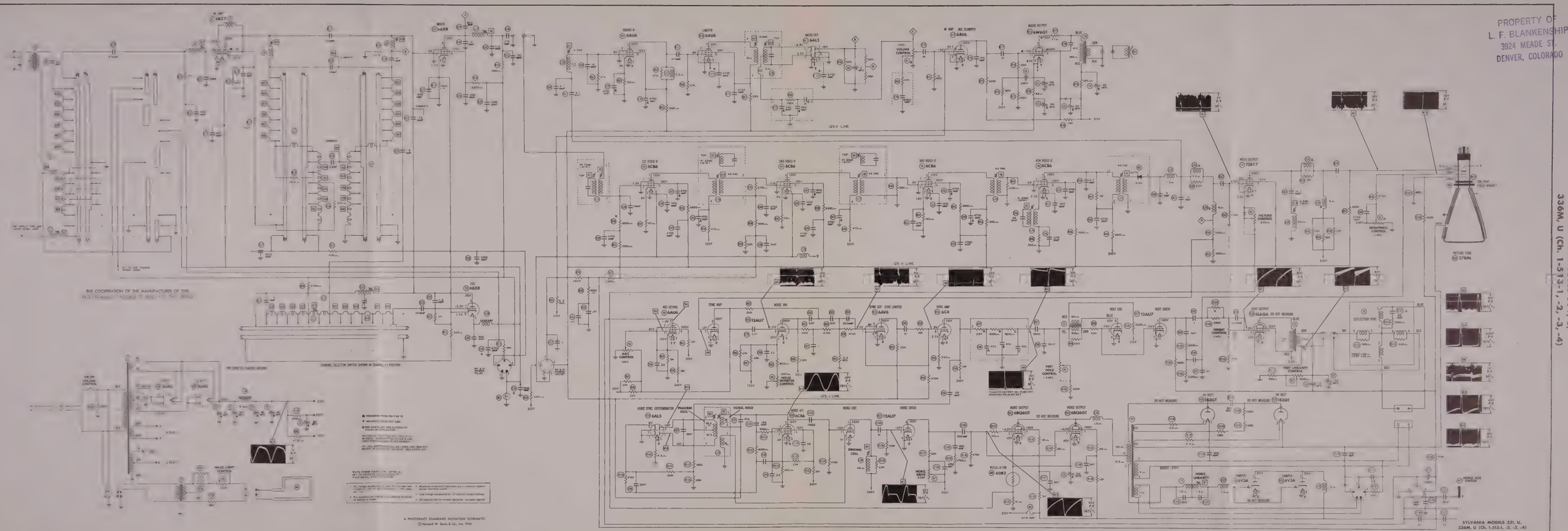

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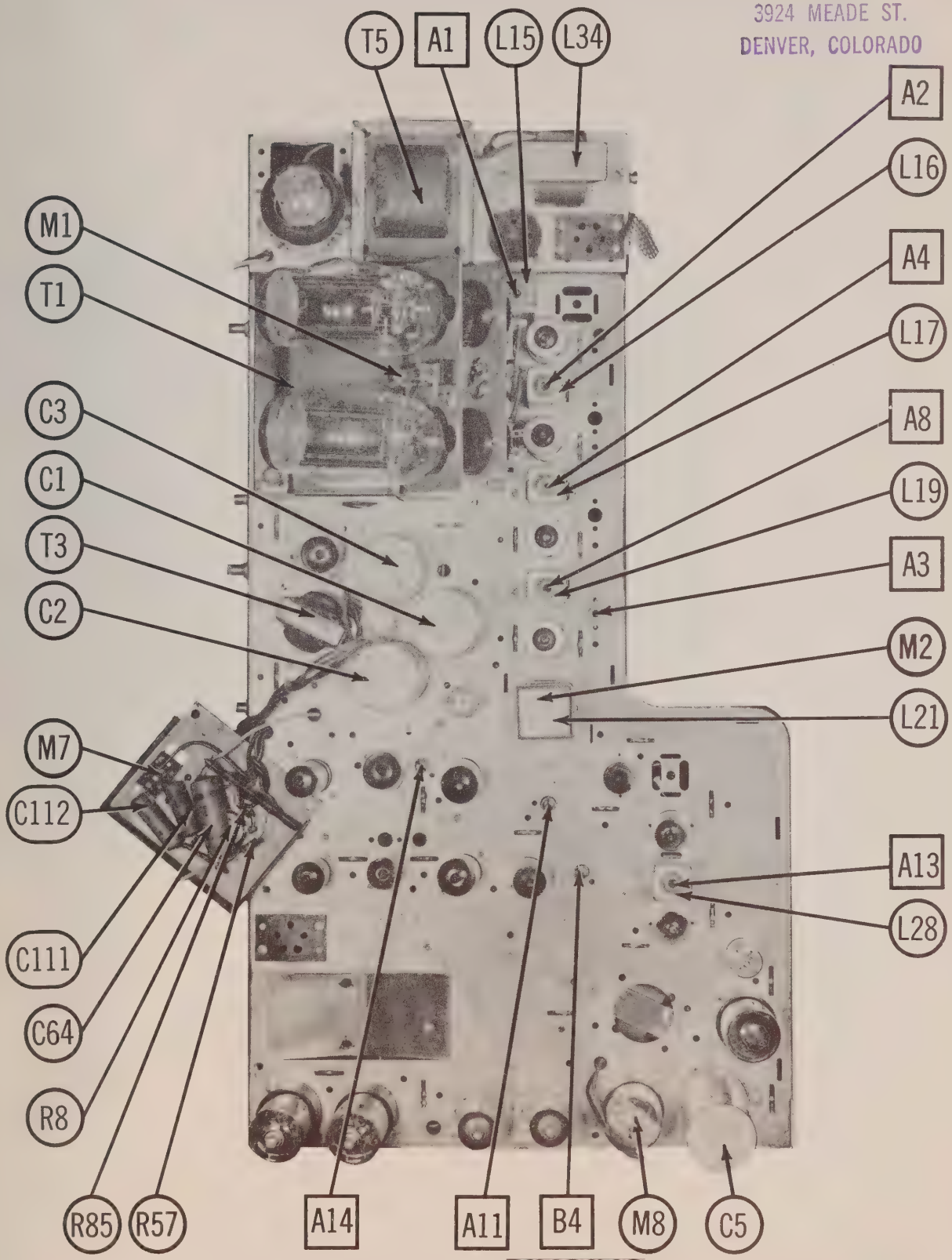
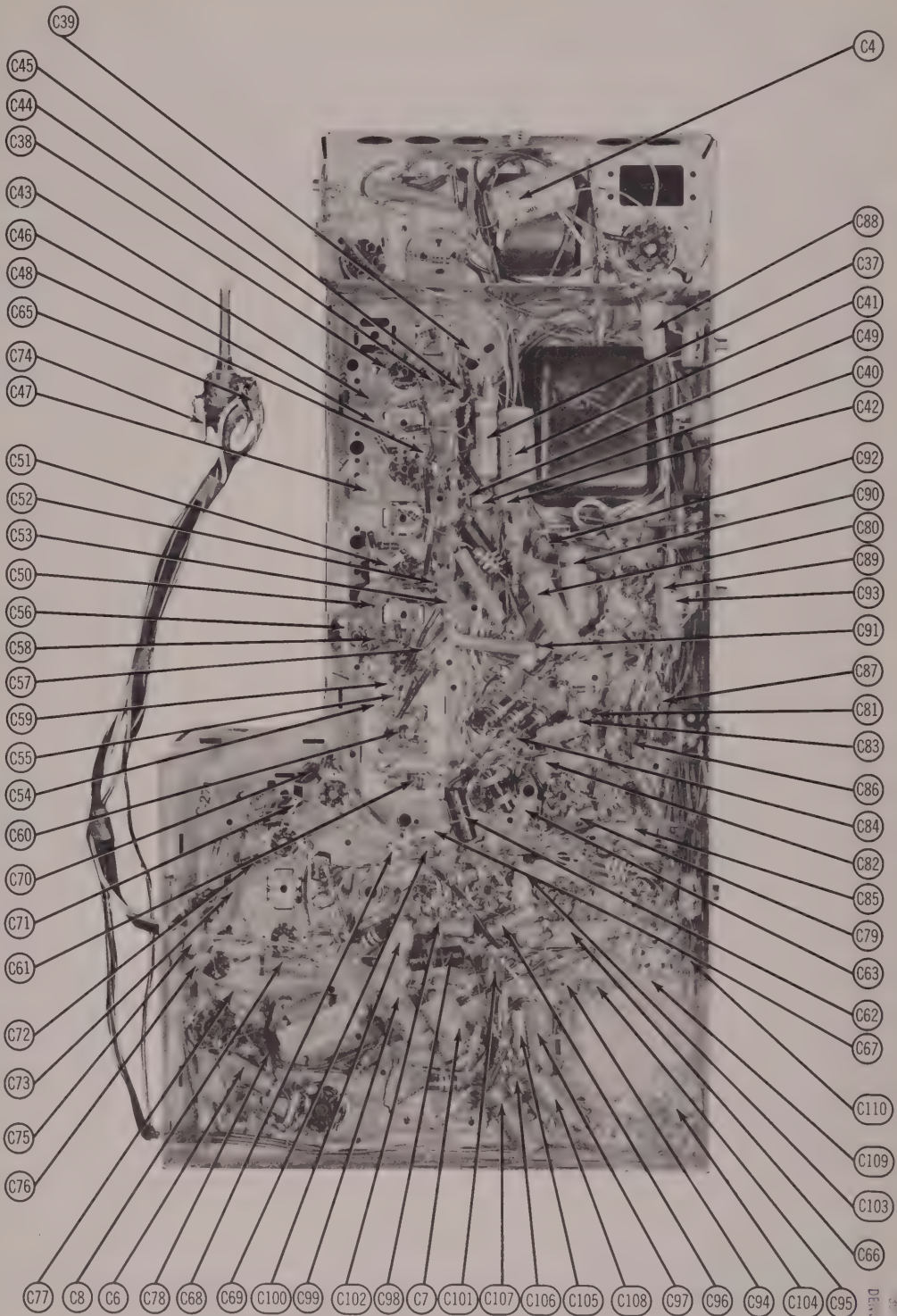


CHASSIS TOP VIEW



CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

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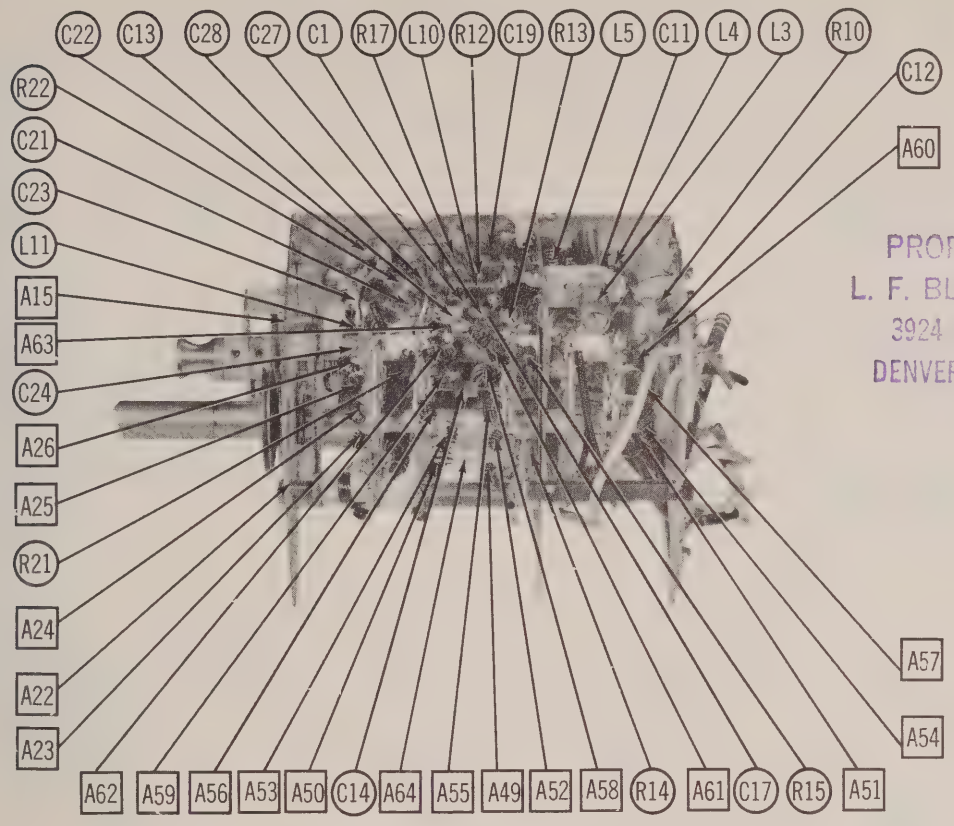
336M, U (Ch. 1-513-1, -2, -3, -4)



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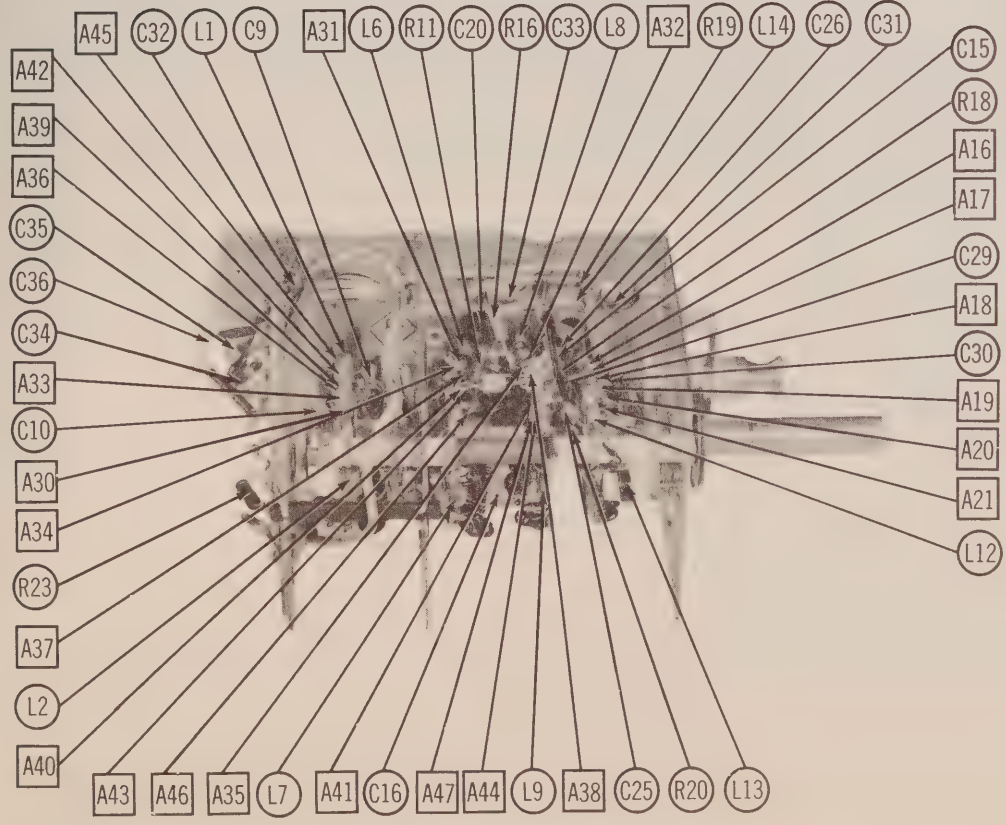
VHF TUNER-RIGHT SIDE



VHF TUNER-LEFT SIDE

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ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped and kept away from the chassis. Do not remove the horizontal oscillator tube (V2I) to disable the high voltage.
Connect the deflection yoke and secure the shorting bar on the high voltage cage in a forward position. Connect the tuner chassis to the main chassis.
Be sure the VHF tuner cover is in place.
Allow a 15 minute warm-up period for receiver and test equipment.

VIDEO IF ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Direct	High side to an ungrounded tube shield floating over converter tube (V2). Low side to chassis.	Not used	39.75MC (Unmod)	Any unused high band channel	Use VTVM. DC probe to point ⑥. Common to chassis.	A1	Connect the negative lead of a 3 volt bias supply to the ungrounded side of C40. Connect positive lead to chassis. Attenuate generator output to maintain 1 to 2 volts on VTVM. Adjust for MINIMUM deflection.
2.	"	"	"	41.25MC	"	"	A2, A3	"
3.	"	"	"	47.25MC	"	"	A4	"
4.	"	High side coupled loosely to point ⑥. Low side to chassis. (Lower converter tube shield to normal position)	43.25MC (10MC Swp)	43.1MC 45.75MC	"	Vert. Amp. thru detector (Fig.1) to pin 5 (plate) of 6CB6 (V3). Low side to chassis.	A5, A6	Remove 3 volt bias supply. Disconnect primary of L16 from pin 5 of V3 and connect a 330Ω resistor from pin 5 of V3 to the B+ end of L16. Alternately adjust A5 and A6 until response similar to Fig. 2 is obtained. Remove 330Ω resistor and restore connection to primary of L16.
5.	Direct	High side to an ungrounded tube shield floating over converter tube (V2). Low side to chassis.	Not used	44.0MC	"	Use VTVM. DC probe to point ⑥. Common to chassis.	A7	Reconnect 3 volt bias supply as in step 1 and attenuate generator output to maintain 1 to 2 volts on VTVM. Adjust for maximum deflection.
6.	"	"	"	43.0MC	"	"	A8	"
7.	"	"	"	45.2MC	"	"	A9	"
8.	"	"	"	43.8MC	"	"	A10	Adjust for maximum deflection. Repeat steps 1 thru 3.
9.			43.25MC (10MC Swp)	41.25MC 43.1MC 45.0MC 45.75MC 47.25MC	"	Vert. Amp. thru 33KΩ to point ⑥. Low side to chassis.		Use high scope gain and low sweep generator output. Check for response curve similar to Fig. 3. If necessary SLIGHTLY retouch A7 thru A10 to obtain desired response.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 100KΩ (±1%) resistors in series from point ⑥ to chassis. The junction of these two resistors is alignment point ⑥ as shown on the schematic

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
10.	.001MFD	High side to point ⑥. Low side to chassis.	4.5MC (Unmod)	Any non-interfering channel	DC probe to point ⑥. Common to chassis.	A11, A12	Adjust for maximum deflection.
11.	"	"	"	"	DC probe to point ⑥. Common to point ⑥.	A13	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60% modulation and 450KC sweep. Use 120% sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.	.001MFD	High side to point ⑥. Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any non-interfering channel	Vert. Amp. to point ⑥. Low side to chassis.	A11, A12	Disconnect stabilizing capacitor C8. Adjust for curve of maximum amplitude and symmetry similar to Fig. 4.
11.	"	"	"	"	"	Vert. Amp. to point ⑥. Low side to chassis.	A13	Reconnect stabilizing capacitor C8. Adjust so that 4.5MC occurs at center of cross-over lines as in Fig. 5. SLIGHTLY retouch A13 for maximum amplitude and straightness of crossover lines.

ALTERNATE SOUND IF ALIGNMENT

If a 4.5MC signal of crystal accuracy is not available the sound IF strip may be aligned by tuning in a strong TV station. Connect the VTVM and adjust A11, A12 and A13 as outlined in steps 10 and 11 under "Sound IF alignment using AM signal generator and VTVM."

4.5MC TRAP ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
12.	.001MFD	High side to pin 2 (grid) of 1B3GT. Low side to chassis.	4.5MC (Unmod)	Any	DC probe thru detector (Fig.1) to pin 1 (cathode) of picture tube. Common to chassis.	A14	Short pin 1 (grid) of 6CB6 (V6) to chassis. Adjust A14 for MINIMUM deflection.

VHF TUNER ALIGNMENT

Connect the negative lead of a 3 volt bias supply to terminal #8 on tuner terminal strip. Connect the positive lead to tuner chassis. Disconnect the primary winding of L16 from Pin 5 (plate) of 6CB6 (V3) and connect a 330Ω resistor from pin 5 of V3 to the B+ end of L15.
Remove the second video IF amplifier tube (V4) from its socket.
During alignment the use of two marker generators is required. Generator #1 (LF) is coupled loosely (a turn or two around probe input lead) to the input of detector, probe (See Fig. 6).
Marker generator # 2 (RF) is coupled loosely (a turn or two around high side lead of sweep generator) across sweep generator at the VHF antenna terminals. If the sweep generator has a built-in marker generator, it should be used for marker generator # 2.
Since it is necessary during tuner alignment to switch the scope vertical input between the IF detector circuit (Fig. 7) which is connected to pin 5 of V3, and the RF detector circuit (Fig. 6) which is connected to alignment point ⑥ on the tuner, it is recommended that a single pole double throw switch be mounted as closely as possible to the scope input terminals so the vertical input terminals may be easily switched between the RF and IF detector circuits. All connecting leads should be shielded and kept as short as possible.
Set the fine tuning control so the plates are approximately half meshed.
Use maximum scope gain and only enough sweep generator output to provide useable indication on scope.
Use non-metallic alignment tools to adjust coil increments.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

ALIGNMENT INSTRUCTIONS

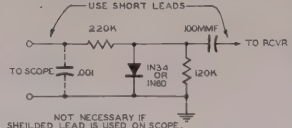


FIG. 1

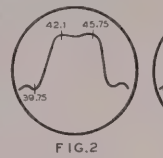


FIG. 2

FIG. 3

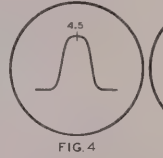


FIG. 4

FIG. 5

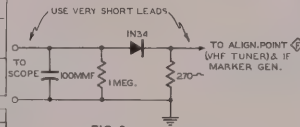


FIG. 6

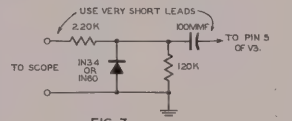


FIG. 7

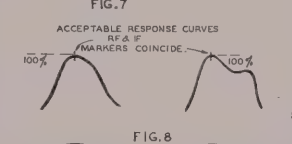


FIG. 8

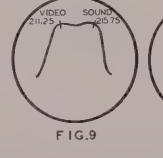


FIG. 9

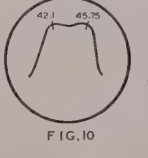


FIG. 10

VHF TUNER OSCILLATOR ALIGNMENT

Since channels 2 to 5 and 7 to 12 are aligned by expanding or compressing coil increments, the preceeding aligned increments must not be disturbed.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
13.	Two 120Ω Carbon Resistors	Across VHF antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC (HF Marker) 45.75MC (LF Marker)	13	Vert. Amp. thru detector (Fig.6) to IF marker generator and alignment point ⑥. Low side to chassis.	A15	Adjust so that RF and IF markers coincide as in Fig. 8.
14.	"	"	207MC (10MC Swp)	205.25MC 45.75MC	12	"	A16	Expand or compress coil until markers coincide as in Fig.8. Curves may not be symmetrical until RF alignment is complete.
15.	"	"	201MC (10MC Swp)	199.25MC 45.75MC	11	"	A17	"
16.	"	"	195MC (10MC Swp)	193.25MC 45.75MC	10	"	A18	"
17.	"	"	189MC (10MC Swp)	187.25MC 45.75MC	9	"	A19	"
18.	"	"	183MC (10MC Swp)	181.25MC 45.75MC	8	"	A20	"
19.	"	"	177MC (10MC Swp)	175.25MC 45.75MC	7	"	A21	"
20.	"	"	85MC (10MC Swp)	83.25MC 45.75MC	6	"	A22	Adjust so that RF and IF markers coincide as in Fig. 8.
21.	"	"	79MC (10MC Swp)	77.25MC 45.75MC	5	"	A23	Compress or expand coils until markers coincide as in Fig. 8.
22.	"	"	69MC (10MC Swp)	67.25MC 45.75MC	4	"	A24	"
23.	"	"	63MC (10MC Swp)	61.25MC 45.75MC	3	"	A25	"
24.	"	"	57MC (10MC Swp)	55.25MC 45.75MC	2	"	A26	"

VHF TUNER RF ALIGNMENT

Care must be exercised so that preceeding aligned coil increments are not disturbed.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
25.	Two 120Ω Carbon Resistors	Across VHF antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru detector (Fig. 6) to IF marker generator and alignment point ⑥. Low side to chassis.	A27, A28 A29	Adjust for response curve similar to Fig. 9. Adjust A27 for maximum mid-band amplitude regardless of skirt contour. Adjust A29 for symmetrical skirt contour. Adjust A28 for flat topped response. Video carrier must be at 100%. Sound carrier may be as low as 70%.
26.	"	"	"	45.75MC 43.1MC	"	Vert. Amp. thru detector (Fig.7) to pin 5 of V3. Low side to chassis.	A5, A6	Adjust for response curve similar to Fig.10.
27.	"	"	"	211.25MC 215.75MC	13	Vert. Amp. thru detector (Fig. 6) to IF marker generator and alignment point ⑥. Low side to chassis.		If necessary, SLIGHTLY retouch A28 for flat-topped response similar to Fig. 11. There must not be more than 5% dip in response curve.
28.	"	"	207MC (10MC Swp)	205.25MC 209.75MC	12	"	A30, A31 A32	Compress or expand coils for channel 12 to obtain response similar to Fig. 12. A30 affects mid-band amplitude, A31 affects skirt contour and A32 affects flat topping or response curve.
29.	"	"	201MC (10MC Swp)	199.25MC 203.75MC	11	"	A33, A34, A35	Compress or expand coils for response similar to Fig. 12. Video and sound markers must remain on top of curve.
30.	"	"	195MC (10MC Swp)	193.25MC 197.75MC	10	"	A36, A37 A38	"
31.	"	"	189MC (10MC Swp)	187.25MC 191.75MC	9	"	A39, A40, A41	"
32.	"	"	183MC (10MC Swp)	181.25MC 185.75MC	8	"	A42, A43 A44	"
33.	"	"	177MC (10MC Swp)	175.25MC 179.75MC	7	"	A45, A46 A47	"
34.	"	"	85MC (10MC Swp)	83.25MC 87.75MC	6	"	A48, A49 A50	"
35.	"	"	79MC (10MC Swp)	77.25MC 81.75MC	5	"	A51, A52 A53	"
36.	"	"	69MC (10MC Swp)	67.25MC 71.75MC	4	"	A54, A55 A56	"
37.	Two 120Ω Carbon Resistors	Across VHF antenna terminals with 120Ω in each lead.	63MC (10MC Swp)	61.25MC 65.75MC	3	Vert. Amp. thru detector (Fig.6) to IF marker generator and alignment point ⑥. Low side to chassis.	A57, A58 A59	Compress or expand coils for response similar to Fig.12. Video and sound markers must remain on top of curve.
38.	"	"	57MC (10MC Swp)	55.25MC 59.75MC	2	"	A60, A61 A62	"
39.	Recheck all channels for flat-topped response. If necessary, retouch A28 thru A62 in order given. A dip of 30% is permissible for all channels. If band width on any channel is insufficient after foregoing adjustments adjust "gimmicks" A63 and A64 by bending wires away from or toward capacitors C14 and C16. Remove 330Ω resistor from pin 5 of V3 to B+. Restore connection to L16. Replace V4 in its socket. Remove test equipment.							

ALIGNMENT INSTRUCTIONS (cont)

UHF TUNER ALIGNMENT

Switch VHF tuner to UHF position.

UHF OSCILLATOR ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
40.	Two 120Ω Carbon Resistors	Across UHF antenna terminals with 120Ω in each lead.	900MC (Unmod)	See remarks	DC probe to point (A). Common to chassis.	A66	Set UHF variable capacitor plates to MINIMUM capacity. Adjust A66 for maximum deflection.
41.	"	"	470MC (Unmod)	14	"		If low frequency coverage is incorrect remove tuner cover and adjust oscillator plates on tuning gang for maximum deflection. Replace tuner cover and repeat step 40.

UHF OUTPUT CIRCUIT ALIGNMENT

Disconnect the primary winding of L16 from pin 5 (plate) of 6CB6 (V3) and connect a 330Ω resistor from pin 5 of V3 to the B+ end of L16. Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
42.	3.3KΩ Carbon Resistor	High side thru 3.3KΩ to point (G). Low side to chassis.	43.25MC (10MC Swp)	42.1MC 45.75MC	Any	Vert. Amp. thru detector (Fig. 1) across 330Ω resistor connected to pin 5 of V3.	A65,A67	If the sweep generator does not have built-in markers, loosely couple a marker generator to the high side of the sweep generator near the 3.3KΩ resistor. Adjust for response similar to Fig.13. A65 positions the 45.75MC marker and A67 positions the 42.1MC marker.

ALTERNATE ON THE AIR UHF OUTPUT CIRCUIT ALIGNMENT

Restore the set to normal operating condition. If the UHF tuner tracking is normal picture quality may be improved by tuning in a UHF station test pattern and adjusting A65 and A67 for best vertical wedge resolution and best sound.

UHF PRE SELECTOR ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection. The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
43.	Fig. 14	Thru matching pad (Fig.14) to UHF. antenna terminals.	900MC (10MC Swp)	42.1MC 45.75MC (See remarks)	See Remarks	Vert. Amp. thru detector (Fig.1) across 330Ω resistor connected to pin 5 of V3.	A68,A69	Remove UHF tuner cover and turn UHF channel selector until tuning capacitor plates are fully open. Replace UHF tuner cover. Couple the marker generator to pin 2 (cathode) of 6CB6 (V3). Adjust A68 and A69 in order given for response similar to Fig. 13.

44. Simultaneously turn sweep generator and UHF tuner thru the UHF band. If response curve at lower end of band is not within the limits shown in Fig. 13, remove UHF tuner cover and adjust mixer and antenna segments on variable tuning capacitor plates for best over all response. Replace tuner cover and recheck entire UHF band.
Disconnect test equipment. Remove 330Ω resistor from pin 5 of V3 and restore connection of L16 to pin 5 of V3.

FIG.11

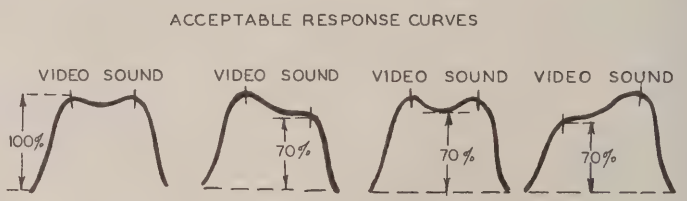


FIG.12

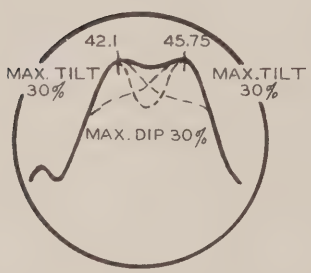


FIG.13

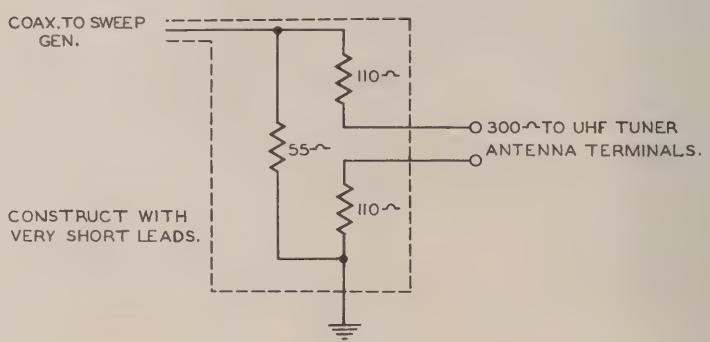
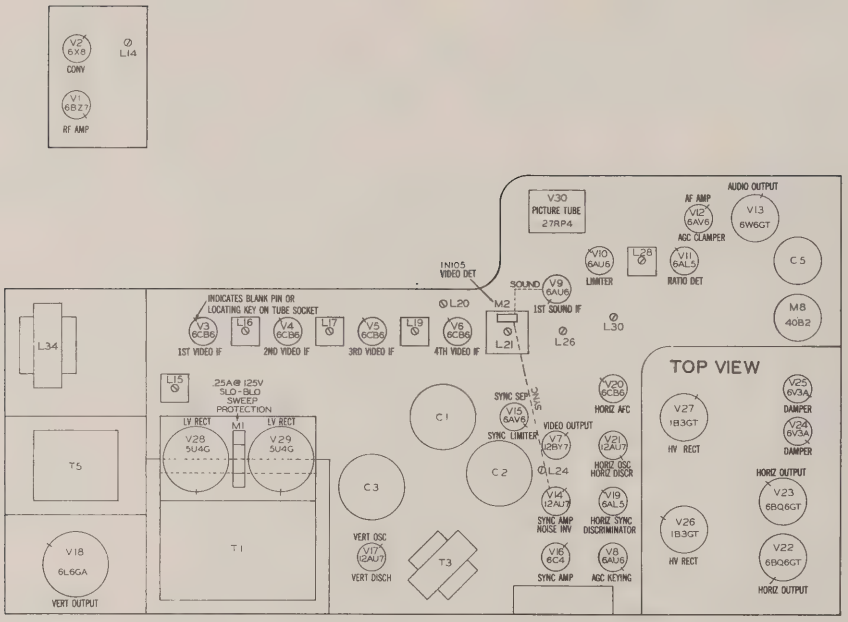


FIG. 14

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - **V28, V29**

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster -**V2, V3, V4, V5, V6, V13**
No pic, no sound, has snow - **V1, V2, V3**
No pic, has sound, has raster - **V7, V30**
Has pic, no sound - **V9, V10, V11, V12, V13**
Overloaded picture - **V8, V12**

SYNC FAILURE
No vert. sync - **V16, V17**
No horiz. sync - **V16, V19, V20, V21**
No vert. or horiz. sync - **V14, V15, V16**

SWEEP FAILURE
No raster, has sound - **V20, V21, V22, V23, V24, V25, V26, V27, V30, Fuse (M1)**
No vertical deflection - **V17, V18**
Poor vert. linearity or foldover -**V17, V18**
Poor horiz. linearity or foldover - **V21, V22, V23, V24, V25**
Narrow picture - **V21, V22, V23, V24, V25, V26, V27, V28, V29**
Vert. off freq. - **V16, V17**
Horiz. off freq. - **V16, V19, V20, V21**

RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BZ7	†3.8KΩ	430KΩ	INF	.1Ω	0Ω	INF	615KΩ	0Ω	0Ω
V 2	6X8	0Ω	15KΩ	▲4.7KΩ	0Ω	.1Ω	220Ω	220KΩ	▲2.2KΩ	▲1KΩ
V 3	6CB6	36KΩ	47Ω	0Ω	.1Ω	†5.2KΩ	▲6.8KΩ	0Ω		
V 4	6CB6	34KΩ	47Ω	.1Ω	0Ω	†5.2KΩ	▲6.8KΩ	0Ω		
V 5	6CB6	.1Ω	180Ω	0Ω	.1Ω	▲1KΩ	▲6.8KΩ	0Ω		
V 6	6CB6	.1Ω	330Ω	.1Ω	0Ω	†8.8KΩ	▲1KΩ	0Ω		
V 7	12BY7	250Ω	470KΩ	250Ω	.1Ω	.1Ω	0Ω	†4KΩ	▲0Ω	250Ω
V 8	6AU6	†130KΩ	11KΩ	▲68Ω	▲68Ω	150KΩ	†15KΩ	11KΩ		
V 9	6AU6	47KΩ	0Ω	.1Ω	0Ω	▲1KΩ	▲1KΩ	100Ω		
V 10	6AU6	47KΩ	0Ω	.1Ω	0Ω	▲22KΩ	▲22KΩ	0Ω		
V 11	6AL5	INF	INF	.1Ω	0Ω	0Ω	0Ω	68KΩ		
V 12	6AV6	15Meg	0Ω	0Ω	.1Ω	540KΩ	0Ω	†230KΩ		
V 13	6W6GT	INF	▲68Ω	†810Ω	†10KΩ	160KΩ	†660Ω	▲68Ω	INF	
V 14	12AU7	†330KΩ	2.8Meg	5KΩ	.1Ω	.1Ω	†17KΩ	▲1.8KΩ	0Ω	0Ω
V 15	6AV6	2.7Meg	0Ω	0Ω	.1Ω	▲470KΩ	▲470KΩ	▲33KΩ		
V 16	6C4	†17KΩ	INF	0Ω	.1Ω	†17KΩ	▲470KΩ	330Ω		
V 17	12AU7	▲780KΩ	1.3Meg	0Ω	0Ω	0Ω	†3.5KΩ	1.3Meg	0Ω	.1Ω
V 18	6L6GA	INF	.1 Ω	†790Ω	†41Ω	1Meg	1.2KΩ	0Ω	1.2KΩ	
V 19	6AL5	0Ω	1.1Meg	.1Ω	.3Ω	200KΩ	0Ω	1.1Meg		
V 20	6CB6	680KΩ	330Ω	0Ω	.1Ω	▲40Ω	†12KΩ	330Ω		
V 21	12AU7	†2.1KΩ	470KΩ	10Ω	0Ω	0Ω	†120KΩ	150KΩ	0Ω	.1Ω
V 22	6BQ6GT	INF	0Ω	†120KΩ	†15.1KΩ	470KΩ	INF	.1Ω	60Ω	TOP CAP ▲11Ω
V 23	6BQ6GT	†15KΩ	.1Ω	470KΩ	†15.1KΩ	470KΩ	†15KΩ	0Ω	60Ω	TOP CAP ▲11Ω
V 24	6V3	INF	†50Ω	INF	0Ω	.1Ω	INF	†50Ω	INF	†50Ω	TOP CAP 800KΩ
V 25	6V3	INF	†50Ω	INF	.1Ω	0Ω	INF	†50Ω	INF	†50Ω	TOP CAP 800KΩ
V 26	1B3GT		PINS	1 - 8	HAVE	INF	RESISTANCE			TOP CAP ▲145Ω
V 27	1B3GT		PINS	1 - 8	HAVE	INF	RESISTANCE			TOP CAP INF
V 28	5U4G	INF	12KΩ	INF	12Ω	INF	12Ω	INF	12KΩ	
V 29	5U4G	INF	12KΩ	INF	11.5Ω	INF	11.5Ω	INF	12KΩ	
V 30	27RP4	▲68Ω	†650KΩ	PIN 10 ▲430KΩ	PIN 11 ▲330KΩ	PIN 12 ▲68Ω				

† MEASURED FROM PIN 8 OF V29
▲ MEASURED FROM 125V LINE
▲ MEASURED FROM TOP CAP OF V25

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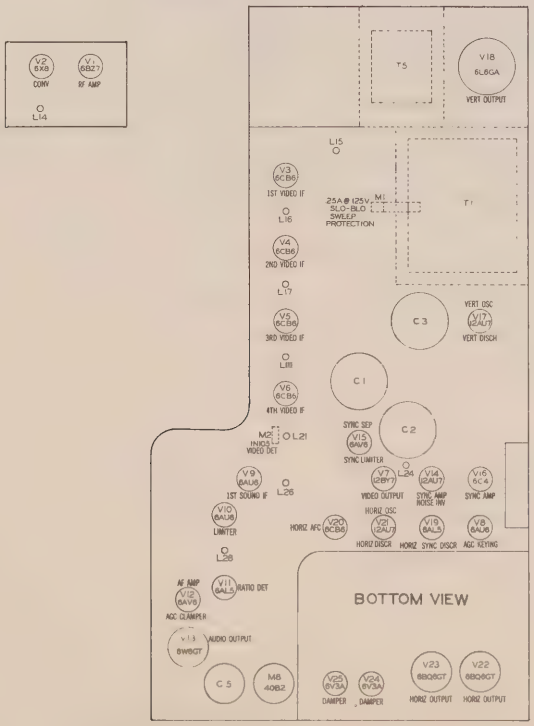
DENVER, COLORADO



TUBE PLACEMENT CHART

SET 248 FOLDER 9

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Adjust R7, M7 and B1. Check by substitution V22, V23, V24, V25, V28 and V29. Check Peak to Peak Voltage of W18. Check C109, C111, C112, C5A, C105, R128 and other associated components.

DRIVE LINES

Adjust R7, M7 and B1. Substitutie V22 and V23. Check T4, C106, R136, R133 and other associated components.

COMPRESSED LEFT SIDE

Check by substitution V22, V23, V24 and V25. Check components associated with the horizontal output and damper stages, especially T4 and T6A for failure or change of value.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check by substitution V20, V21, V22 and V23. Check C101, C97, C99, R119, R123 and other associated components.

XMAS TREE EFFECT

Check by substitution V20, V21, V22, V23, V24 and V25. Check L29, C102, C103, T4 and T6 for internal arcing.

VERTICAL

LOSS OF SWEEP

Check by substitution V17 and V18. Check waveform W11.

If Satisfactory	If Unsatisfactory
Check T5, T6B and other associated components.	Check T3, R102, R110, R4 and other associated components.

INSUFFICIENT SWEEP

Check height and vertical linearity controls for proper adjustment. Follow procedure outlined under "Loss of Sweep".

COMPRESSED AT BOTTOM

Check by substitution V17 and V18. Check T5, T6B, R3, R4, R110, C92 and other associated components.

COMPRESSED AT TOP

Check by substitution V17 and V18. Check R3, C3B, C4 and other associated components.

FOLDS

Check by substitution V17 and V18. Check components associated with V17 and V18 for failure or change of value.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Check by substitution V14 , V15 and V16. Check C83, C85, R96, R80, R81, R82 R92 and other associated components.

LOSS OF VERTICAL SYNC-HORIZONTAL SYNC SATISFACTORY

Substitute V17. Check waveform W9.

If Satisfactory	If Unsatisfactory
Check T3, R99, R2, R100, C88 and other associated components.	Check vertical integrator network and other associated components. Check video IF alignment for overloading.

LOSS HORIZONTAL SYNC-VERTICAL SYNC SATISFACTORY

Check by substitution V19, V20 and V21. Check waveform W15.

If Satisfactory	If Unsatisfactory
Check L29, R122, R121, R123, C101, C100 and other associated components.	Check C94, C95, C96, R118, R115, R116 and other associated components.

HORIZONTAL BENDING

Check by substitution V14, V15, V16, V19 and V20. Check horizontal AFC network for component failure or change of value.

VIDEO

LOSS OF VIDEO

Substitute V7. Check components associated with V7. Check picture tube.

SOUND BARS (4.5MC BEAT)

Adjust tuner fine tuning for best picture and sound. Check adjustment A14. Check video IF alignment.

POOR CONTRAST

Substitute V7. Check video detector crystal network. Check picture tube and other associated components.

NEGATIVE PICTURE

Substitute V7. Check video detector crystal network. Check picture tube. Check AGC network for proper operation.

SMEAR

Substitute V7. Check L22, L23A, L23B, L25A and L25B, R49, R53, and other associated components.

WIDE BLACK BAR ACROSS PICTURE

Check by substitution V1, V3, V4, V5, V6 and V7 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V9, V10, V11, V12 and V13. Check stages V12 and V13 using audio signal generator. Apply audio signal across R1B.

If Satisfactory	If Unsatisfactory
Check components associated with V9, V10 and V11. Check audio IF alignment.	Check C75, C77, C78, R78, R72, T8, speaker and other associated components.

BUZZ

Adjust tuner fine tuning for best picture and sound. Adjust A13 for minimum buzz. Check C8 and audio IF alignment.

DISTORTED

Follow procedure outlined under "Weak or No Sound".

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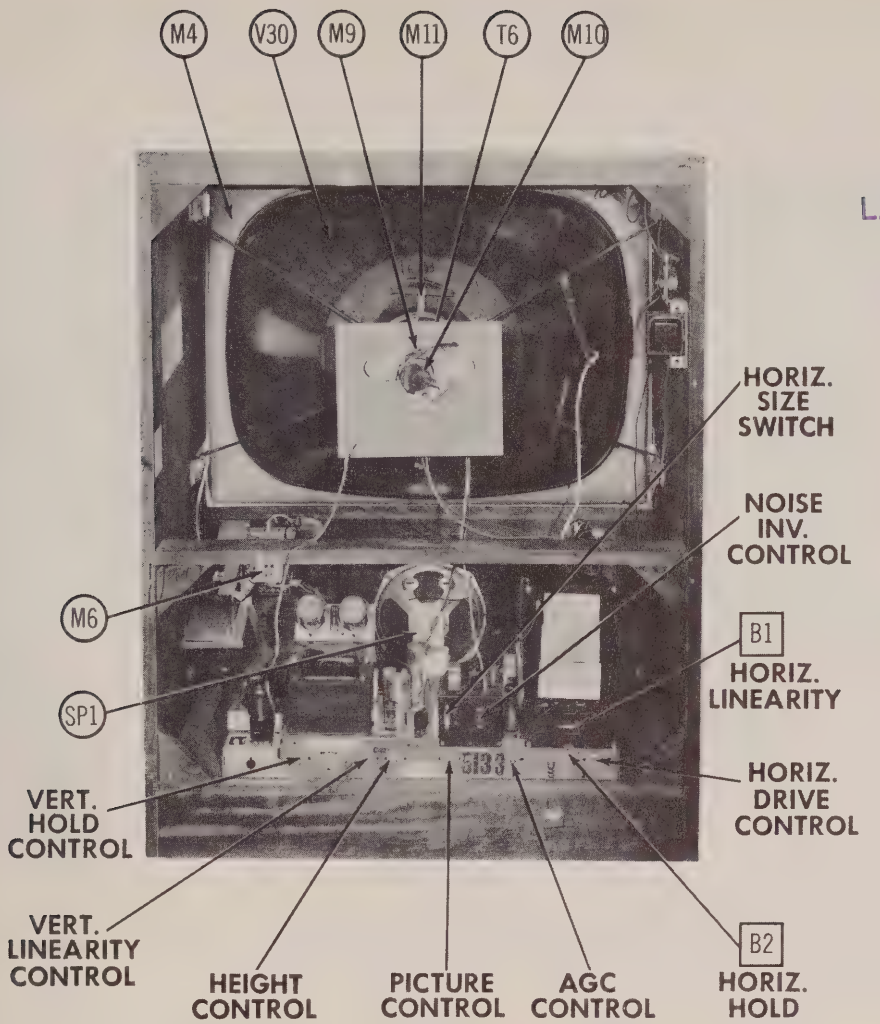


CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in the strongest TV station available. Adjust the contrast and brightness controls for a normal picture.

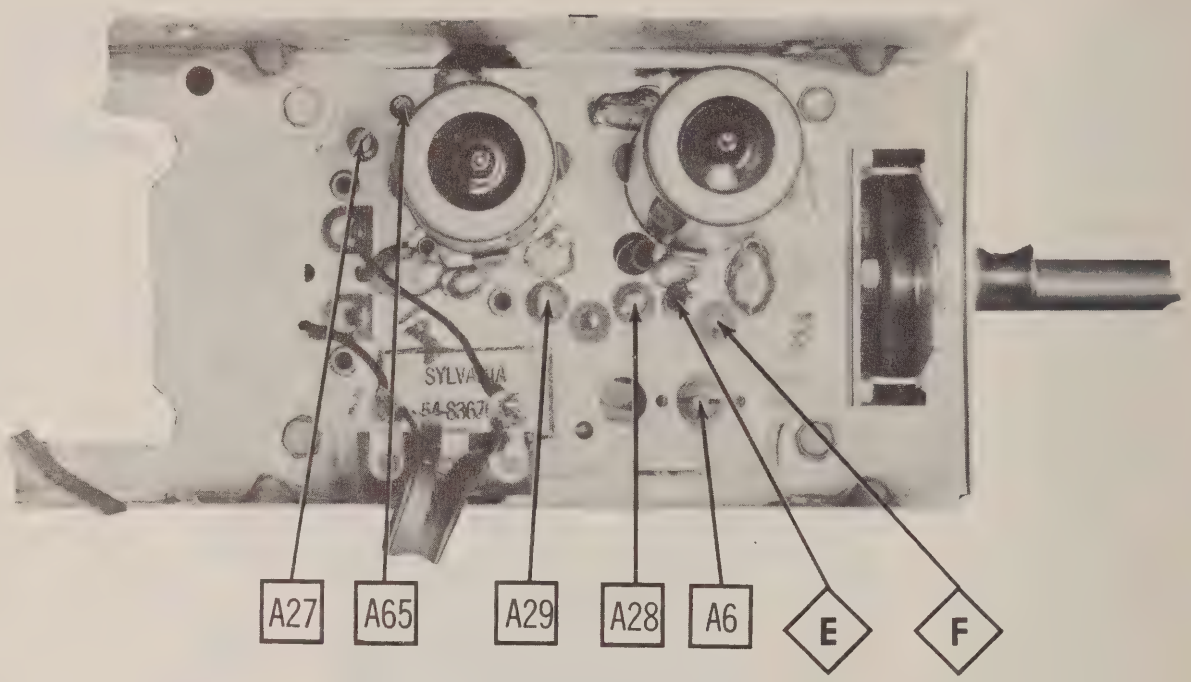
HORIZONTAL HOLD ADJUSTMENT
1. Adjust the horizontal linearity slug (B1) for a picture that is symmetrical from left to right.
2. Adjust the horizontal drive control clockwise as far as possible without the presence of vertical white lines or compression near the center of the raster.
3. Remove the horizontal discriminator tube (6AL5), V19, from its socket and adjust the horizontal hold slug (B2) until the picture drifts slowly back and forth with the blanking bar vertical.
4. Replace V19 in its socket.
5. Switch off channel and back again. The picture should fall into synchronization.

HORIZONTAL PHASE ADJUSTMENT
1. Turn the ringing coil slug (B4) fully counter clockwise and short out the peaking resistor R128.
2. Repeat steps 3, 4 and 5 of "Horizontal Hold Adjustment".
3. Adjust the phasing coil slug (B3) until the blanking bars on each side of the picture are equal. Set the contrast control for minimum contrast and readjust the brightness control, then move the picture to the left and to the right with the centering lever so that the blanking bars are visible.
4. Repeat steps 3 and 4 of "Horizontal Hold Adjustment".
5. Repeat step 3.
6. Remove short from across R128 and repeat step 2 of "Horizontal Hold Adjustment".
7. Adjust the ringing coil slug (B4) for equal blanking on both edges of the picture.
8. Repeat steps 3, 4 and 5 of "Horizontal Hold Adjustment".

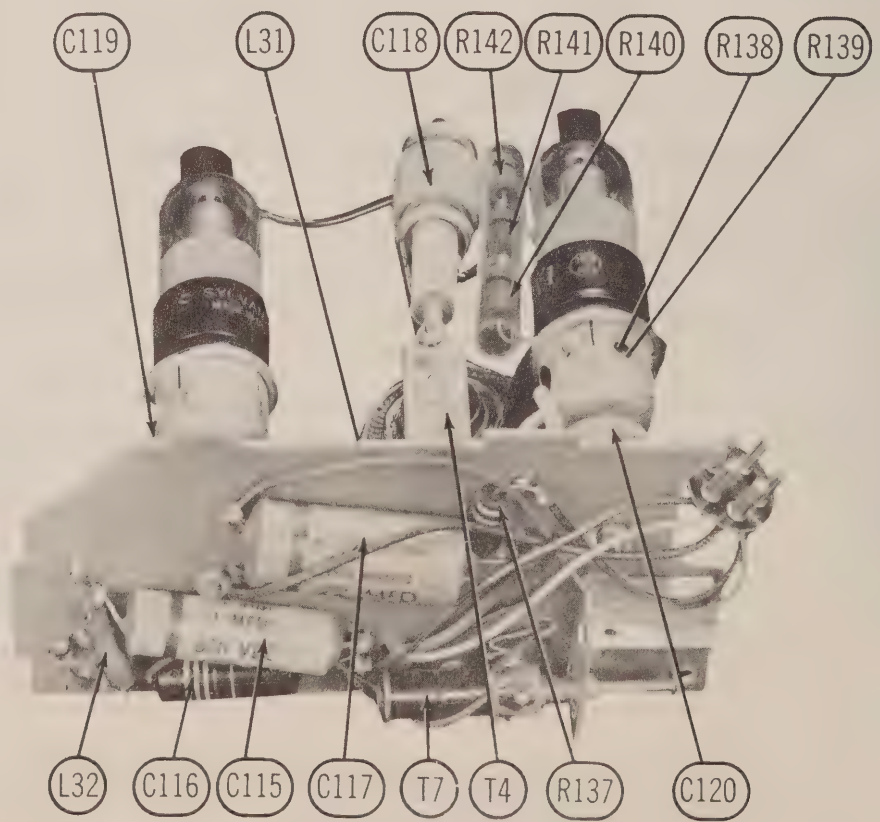
AGC CONTROL ADJUSTMENT
Whenever the receiver is connected to a different antenna installation the AGC control (rear panel) should be readjusted as follows:
1. Turn the noise inverter control (R8) and the brightness control fully clockwise. Set the contrast control to approximately 7/8 of its maximum contrast position.
2. Tune in the strongest TV station available.
3. Turn the AGC control maximim clockwise, entirely blacking out the picture.
4. Back-off the AGC control for a picture with slightly more than normal contrast.

Reduce the contrast control for proper contrast.
NOTE: The AGC control should not be used a contrast control.

NOISE INVERTER CONTROL ADJUSTMENT
The noise inverter control (R8) is preset to its maximum clockwise position at the factory. If readjustment of R8 becomes necessary in the field due to interference or weak signal area proceed as follows:
1. Check adjustment of AGC control as outlined above.
2. Tune in a weak station and turn R8 counter clockwise until picture bends.
3. Turn R8 clockwise just beyond point where picture bends.
4. Tune in all other available stations and check operation of R8. If necessary, turn R8 slightly more clockwise if "bending" of picture exists.



VHF TUNER-TOP VIEW



HIGH VOLTAGE CHASSIS

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: SYLVANIA PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	RF Amplifier	6BZ7	6BZ7	9AJ	
V2	Converter	6X8	6X8	9AK	
V3	1st. Video IF Amp.	6CB6	6CB6	7CM	
V4	2nd. Video IF Amp.	6CB6	6CB6	7CM	
V5	3rd. Video IF Amp.	6CB6	6CB6	7CM	
V6	4th. Video IF Amp.	6CB6	6CB6	7CM	
V7	Video Output	12BY7	12BY7	9BF	
V8	AGC Keying	6AU6	6AU6	7BK	
V9	1st. Sound IF Amp.	6AU6	6AU6	7BK	
V10	Limiter	6AU6	6AU6	7BK	
V11	Ratio Detector	6AL5	6AL5	6BT	
V12	AF Amplifier-AGC Clamper	6AV6	6AV6	7BT	
V13	Audio Output	6W6GT	6W6GT	7S	
V14	Sync Amplifier Noise Inverter	12AU7	12AU7	9A	
V15	Sync Separator-Sync Limiter	6AV6	6AV6	7BT	
V16	Sync Amplifier	6C4	6C4	6BG	
V17	Vert. Oscillator-Vert. Discharge	12AU7	12AU7	9A	
V18	Vert. Output	6L6GA	6L6GA	7S	
V19	Horiz. Sync-Discriminator	6AL5	6AL5	6BT	
V20	Horiz. AFC	6CB6	6CB6	7CM	
V21	Horiz. Oscillator-Horiz. Discharge	12AU7	12AU7	9A	
V22	Horiz. Output	6BQ6GT	6BQ6GT	6AM	
V23	Horiz. Output	6BQ6GT	6BQ6GT	6AM	
V24	Damper	6V3A	6V3A	9BD	
V25	Damper	6V3A	6V3A	9BD	
V26	HV Rectifier	1B3GT	1B3GT	3C	
V27	HV Rectifier	1B3GT	1B3GT	3C	
V28	LV Rectifier	5U4G	5U4G	5T	
V29	LV Rectifier	5U4G	5U4G	5T	

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA: SYLVANIA PART No.	CBS-HYTRON PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.	RETMA BASE TYPE	NOTES
V30	27RP4	27RP4	27RP4	27RP4 27EP4		12N 12N	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: SYLVANIA PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C1A	▲40	400	161-2004	AFH2-64		C035		FP377	TVL-2675	
B	▲80	400								
C2A	▲40	400	161-2004	AFH2-64		C035		FP377	TVL-2675	
B	▲80	400								
C3A	■20	400	161-3018	AFH4-80		D053		FP437	TVL-4740	
B	▲40	400								
C	▲100	50								
C4	10	500	161-1010	PRS500/10		BR1250		TC82	R1222	
C5A	20	200	161-4010						TVL-4604	
B	▲20	350								
C	▲100	200								
D	■100	200								
C6	2	50	161-1001	PRS150/4		BBR2-50T		TC302	TVA-1301	
C7	10	450	161-1013	PRS450/10		BR1045		TC72	TVA-1705	
C8	2	50	161-1001	PRS150/4		BBR2-50T		TC302	TVA-1301	
C9	22			SI22NP0	TCZ-22	TZ14	NP0K-220		5TCC-Q2	
C10	47			SI47	D6-470	TP29	GP1K-470	UC-5447	5GA-Q47	
C11	3			SI3NP0	TCZ-3	TZ06	NP0K-030	ZT-5533	5TCCB-V33	
C12	800			BPD-0008	DD-801	K069	801-001	DC-521	5HK-D1	
C13	.33									
C14	.3									
C15	47			SI47	D6-470	TP29	GP1K-470	UC-5447	5GA-T47	
C16	2			SI2.2NP0	TCZ-2.2	TZ05	NP0K-2R2		5TCCB-V22	
C17	1000			EF-001	MFT-1000				503C-D1	
C18	470			BPD-00047	D6-471	K060	801-471	UC-5347	5GA-T47	
C19	800			BPD-0008	DD-801	K069	801-001	DC-521	5HK-D1	
C20	1000			BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C21	.75									
C22	1.5									
C23	10			SI10NP0	TCZ-10	TZ09	NP0K-100	ZT-541	5TCC-Q1	
C24	1.5									
C25	1.6									
C26	1000			BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C27	1000			BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C28	800			BPD-0008	DD-801	K069	801-001	DC-521	5HK-D1	
C29	800			BPD-0008	DD-801	K069	801-001	DC-521	5HK-D1	
C30	10			SI10NP0	TCZ-10	TZ09	NP0K-100	ZT-541	5TCC-Q1	
C31	30									
C32	7.5									
C33	1000			BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C34	4700			BPD-0047	DD-502	K079	811-0047	DC-525	5HK-D47	Note 1
C35	1000			BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	Note 2
C36	270		166-0270N	SI270	D6-271	TP41	GP2K-271	UC-5327	5GA-T27	
C37	.1	200	160-0201	P288-1	DF-104	CUB2P1		PT401	2TM-P1	
C38	1		166-0001P	SI1NP0	TCZ-1	TZ03	NP0K-010		5TCCB-V1	
C39	4700		166-4700D	BPD-0047	DD-502	K079	811-0047	DC-525	5HK-D47	
C40	.047	200	160-0214?	P288-047	DF-503	CUB2S47		PT4147	2TM-S47	
C41	.47	200	160-0204?	P288-47		CUB2P47		PT4047	2TM-P47	
C42	.47	200	160-0204?	P288-47		CUB2P47		PT4047	2TM-P47	
C43A	4700		168-0011D	BPD-2X0047	DD2-502	DK079	811-0047	DC-525	5HK-2D47	
B	4700						811-0047	DC-525		
C44	1000		166-1000D	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C45	4700		166-4700D	BPD-0047	DD-502	K079	811-0047	DC-525	5HK-D47	

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No	RATING CAP	RATING VOLT	SYLVANIA PART No	AEROVOX PART No	CENTRALAB PART No	CORNELL DUBILIER PART No	ERIE PART No	MALLORY PART No	SPRAGUE PART No	NOTES
			REPLACEMENT DATA							
C45	4700		186-4700D	BPD-0047	DD-502	K079	811-0047	DC-525	5HK-D47	
C47A	4700		168-00LID	BPD-2X0047	DD2-502	DK079	811-0047	DC-525	5HK-2D47	
B	4700						811-0047	DC-525		
C48	1000		186-1000D	BPD-001	DD-102	K069	811-001	DC-531	5HK-D1	
C49	4700		186-4700D	BPD-0047	DD-502	K079	811-005	DC-525	5HK-D47	
C50A	4700		186-00LID	BPD-2X0047	DD2-502	DK079	811-005	DC-525	5HK-2D47	
B	4700						811-005	DC-525		
C51	270		186-0270M	SI270	D6-271	TP41	GP2K-271	UC-5327	5GA-T27	
C52	1000		186-00LOD	BPD-001	DD-102	K069	811-001	DC-531	5HK-D1	
C53	4700		186-4700D	BPD-0047	DD-502	K079	811-0047	DC-526	5HK-D47	
C54	4700		186-4700D	BPD-0047	DD-502	K079	811-0047	DC-525	5HK-D47	
C55	4700		186-4700D	BPD-0047	DD-502	K079	811-0047	DC-526	5HK-D47	
C56	270		186-0270M	SI270	D6-271	TP41	GP2K-271	UC-5327	5GA-T27	
C57	1000		186-00LOD	BPD-001	DD-102	K069	811-001	DC-531	5HK-D1	
C58	43		186-0043P		TC2-43	TZ31	NP0K-430	KT-555		
C59	4.7		168-0008M	S14.7MP0	TCZ-4.7	TZ07	NP0K-050	KT-555	5TCCB-V47	
C60	10		168-00L0P	SI0NP0	TCZ-10	TZ09	NP0K-100	KT-546	5TCC-Q1	
C61	10		186-0010P	SI0NP0	TCZ-10	TZ09	NP0K-100	ZT-541	5TCC-Q1	
C62	.1	200	160-0601	P286-1	DF-104	CUB2P1		PT401	2TM-P1	
C63	4.7		168-0008M	S14.7MP0	TCZ-4.7	TZ07	NP0K-050	KT-555	5TCB-V47	
C64	.1	400	160-0601	P488-1	DF-104	CUB4P1		PT401	4TM-P1	
C65	4700		186-00341	BPD-0047	DD-502	K079	811-0047	DC-525	5HK-D47	
C66	.22	200	160-0623	P288-22		CUB2P23		PT6022	2TM-P22	
C67	4.7		168-0008M	S14.7MP0	TCZ-4.7	TZ07	NP0K-050	KT-555	5TCCB-V47	
C68	4.7		168-0008M	S14.7MP0	TCZ-4.7	TZ07	NP0K-050	KT-555	5TCCB-V47	
C69	10		168-0010P	SI0NP0	TCZ-10	TZ09	NP0K-100	ZT-541	5TCC-Q1	
C70A	4700		186-00LID	BPD-2X0047	DD2-502	DK079	811-005	DC-525	5HK-2D47	
B	4700						811-005	DC-525		
C71	47		186-0047N	S147	D6-470	TP29	GP1K-470	UC-5447	5GA-Q47	
C72	4700		186-4700D	BPD-0047	DD-502	K079	811-0047	DC-525	5HK-D47	
C73A	330				D6-331	TP43	GP2K-331	UC-5333		
B	680		*190-0013	*PA-183	D6-681	TP50	GP2K-681	UC-5368	*10DC6	
C	.01				DD-103	K065	811-01	DC-511		
C74	10000		*190-0006	†PA-184	DD-103	K065	811-01	DC-511	5HK-B1	
C75	.05	200	160-0605	P488-01	D6-103	CUB4B1	GP2-333-103	PT411	4TM-B1	
C76	100	500	163-0100	1468-0001	D6-101	5WS1	GP1K-101	MC235	1FM-J1	
C77	.01	600	160-0611	P688-01	D6-103	CUB8B1	GP2-333-103	PT611	6TM-B1	
C78	.015	600	160-0615	P688-015		CUB8B15		PT611	6TM-B15	
C79	.047	400	160-06147	P488-047	DF-503	CUB4S47		PT4147	4TM-S47	
C80	.22	200	160-06022	P288-22		CUB2P22		PT4022	2TM-P22	
C81	.1	200	160-0601	P286-1	DF-104	CUB2P1		PT401	2TM-P1	
C82	.047	200	160-06147	P288-047	DF-503	CUB2S47		PT4147	2TM-S47	
C83	.047	400	160-06147	P488-047	DF-508	CUB4S47		PT4147	4TM-S47	
C84	220	500	163-0220	1469-00025		UK573		MCB240		
C85	.01	400	160-0611	P488-01	D6-103	CUB4B1	GP2-333-103	PT411	4TM-B1	
C85A	.002							PT2623		
B	.005		*190-0007	*PA-110	*PC-100	*115TM1	*1405-01	PT625	*6V-1	
C	.005							PT625		
C87	.0033	600	162-06233	P688-0033	D6-332	CUB6D33	GP2-333-332	PT6233	6TM-D33	
C88	.0047	400	160-06247	P688-0047	D6-472	CUB6D47	GP2-333-472	PT6247	6TM-D47	
C89	.047	600	160-06147	P688-047	DF-503	CUB6S47		PT6147	6TM-S47	
C90	.1	400	160-0601	P488-1	DF-104	CUB4P1		PT401	4TM-P1	
C91	.01	600	160-0611	P688-01	D6-103	CUB6B1	GP2-333-103	PT611	6TM-B1	
C92	.1	400	160-0601	P488-1	DF-104	CUB4P1		PT401	4TM-P1	
C93	330		168-0330	SI330	D6-331	TP43	GP2K-331	UC-5333	5GA-T33	
C94	100	500	163-0100	1468-0001		2ZS71		MCB235	MB-J1	
C95	.0047	400	160-06247	P688-0047	D6-472	CUB6D47	GP2-333-472	PT6247	6TM-D47	
C96	.0047	400	160-06247	P688-0047	D6-472	CUB6D47	GP2-333-472	PT6247	6TM-D47	
C97	.015	400	160-0615	P688-015		CUB6B15		PT611	6TM-B15	
C98	.1	200	160-0601	P288-1	DF-104	CUB2P1		PT401	2TM-P1	
C99	.22	200	160-06022	P288-22		CUB2P22		PT6022	2TM-P22	
C100	.22	400	160-06022	P488-22		CUB4P22		PT6022	4TM-P22	
C101	100	500	163-0100	1468-0001		2ZS71		MCB235	MB-J1	
C102	.0033	400	162-04232	P688-0033	D6-332	CUB6D33	GP2-333-332	PT6233	6TM-D22	
C103	.01	600	160-0611	P688-01	D6-103	CUB6B1	GP2-333-103	PT611	6TM-B1	
C104	4700		186-4700D	BPD-0047	DD-502	K079	811-0047	DC-526	5HK-D5	
C105	680	500	163-0680	1470-0007		2RS768		MB-37		
C106	1000		168-1000P	SI000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	
C107	.047	600	160-06147	P688-047	DF-503	CUB6S47		PT6147	6TM-S47	
C108	.047	600	160-06147	P688-047	DF-503	CUB6S47		PT6147	6TM-S47	
C109	.01	500	160-0611	P688-01	D6-103	CUB6B1	GP2-333-103	PT611	6TM-B1	
C110	1000		168-00LOD	BPD-001	DD-103	K069	811-001	DC-531	5HK-B1	
C111	.0047	600	160-06247	P688-0047	D6-472	CUB6D47	GP2-333-472	PT6247	6TM-D47	
C112	.01	600	160-0611	P688-01	D6-103	CUB6B1	GP2-333-103	PT611	6TM-B1	
C113	4700		168-4700D	BPD-0047	DD-502	K079	811-0047	DC-525	5HK-D47	Note 2
C114	4700		186-4700D	BPD-0047	DD-502	K079	811-0047	DC-525	5HK-D47	Note 2
C115	.1	500	160-0601	P288-1		CUB2P1		PT501	6TM-P1	
C116	.033	500	160-06133	P288-033		PM6S33		PT6133		
C117	.22	500	160-06022	S84-35		CUB6P25		PT6025	6TM-P25	
C118	500	20000	169-0015	HV20C	TV3-502	MMU-20T5	413	HV20035A	20DK-T5	
C119	500	20000	169-0015	HV20C	TV3-502	MMU-20T3	413	HV20035A	20DK-T5	
C120	500	10000	169-0016		TV8-503	MMU-10T5			10DK-T5	
C121	82	2000								Note 3

Note 1. Some models use .22MFD in this application (part #160-02022).
Note 2. Not used in all models.
Note 3. Some models use 56MMF in this application (part #174-0056).
* Items C73A, C73B, C73C, R68 are combined in one unit.
† Items C74 and R69 are combined in one unit.
‡ Items C86A, C86B, C86C, R97A, R97B, R97C are combined in one unit.

CONTROLS

ITEM No	RATING RESISTANCE	RATING WATTS	SYLVANIA PART No	IRC PART No	CLAROSTAT PART No	CENTRALAB PART No	MALLORY PART No	INSTALLATION NOTES
			REPLACEMENT DATA					
R1A	2 Meg		157-0033	* QJ-483	RTV-488		UF26L	Brightness- Panel
B	1 Meg						UA16-T25	Volume tapped at 150KΩ-rear
C	Switch						US-27	Attach to R1B
R2A	1.5 Meg		153-0014	QU-138	A47-2 Meg-S	AB-75	U-155	Vert. Hold
B	Shaft		Not Reg.	RQ	FK5-1/4	AK-1	Not Req.	Attach to R2A
R3	2500Ω	2	153-3012	WK2500R				Vert. Linearity wire wound
R4A	1.5 Meg		153-0014	QU-138	A47-2 Meg-S	AB-75	U-155	Height
B	Shaft		Not Reg.	RQ	FK5-1/4	AK-1	Not Req.	Attach to R4A
R5A	250Ω	2	153-3007	WK-250	A43-300	VK-133	R250L	Picture wire wound
B	Shaft		Not Req.	Not Req.	FK5-1/4	Not Req.	Not Req.	Attach to R5A

CONTROLS (cont)

ITEM No	RATING RESISTANCE	RATING WATTS	SYLVANIA PART No	IRC PART No	CLAROSTAT PART No	CENTRALAB PART No	MALLORY PART No	INSTALLATION NOTES
			REPLACEMENT DATA					
R8A	1 Meg		153-0009	QU-137	A47-1Meg-S	AB 89	SU 54	AGC
B	Shaft		Not Req.	RQ	FK5-1/4	AK-1	Not Req.	Attach to R8A
R7A	250KΩ		153-0007	QU-130	A47-250K-S	AB-50	SU-46	Horiz. Drive
B	Shaft		Not Req.	RQ	FK5-1/4	AK-1	Not Req.	Attach to R7A
R9	400Ω	1	153-0008		39-4000			Noise inverter- wire wound
R9A	350KΩ		153-0019	QU-133	A47-500K-B	B-59	U-50	HoloLight ADJ
B	Shaft		Not Req.	Not Req.	FB-3	Not Req.	Not Req.	Attach to R9A

* CONCENTRIKIT EQUIVALENT KIT - A-2 BASE ELEMENTS & SHAFTS B11-139 & P1-126 (Panel)
B13-137X & R3-316 (Rear) & SWITCH 76-2.

† Universal replacement (Mallory exact duplicate Part No. UA16S3)

RESISTORS

ITEM No.	RATING OHMS	RATING WATTS	SYLVANIA PART No	IRC PART No.	NOTES
			REPLACEMENT DATA		
R10	15KΩ	½		BTS-15K	
R11	470 Ω	½		BTS-470	
R12	1 Meg	½		BTS-1 Meg	
R13	750KΩ	½		BTS-750K	
R14	3900Ω	½		BTS-3900	
R15	1000Ω	½		BTS-1000	
R16	220KΩ	½		BTS-220K	
R17	1000Ω	½		BTS-1000	
R18	2200Ω	½		BTS-2200	
R19	1000Ω	½		BTS-1000	
R20	4700Ω	½		BTS-4700	
R21	220Ω	½		BTS-220	
R23	15KΩ	½		BTS-15K	
R23	56KΩ	½		BTS-56K	
R24	3300Ω	½	197-0013		
R25	5.6 Meg 5%	½	181-0685	BTS-5.6Meg 5%	
R26	390KΩ 5%	½	181-0394	BTS-390K 5%	
R27	120KΩ 5%	½	181-0124	BTS-120K 5%	
R28	10000 5%	½		BTS-1000 5%	
R29	33KΩ 5%	½	181-0333	BTS-33K 5%	
R30	2000Ω 5%	½		BTS-2000 5% Note 1	
R31	1000Ω	½	181-0102	BTS-1000	
R32	4701 5%	½	181-04705	BTS-47 5%	
R33	6800Ω	½	181-0682	BTS-6800	
R34	4700	½	181-0471	BTS-470	
R35	4701 5%	½	181-04705	BTS-47 5%	
R36	6800Ω	½	181-0682	BTS-6800	
R39	470Ω	½	181-0471	BTS-470	
R40	1500Ω	½	181-0152	BTS-1500	
R41	180Ω	½	181-0181	BTS-180	
R42	6800Ω	½	181-0682	BTS-6800	
R43	1000Ω	½	181-0102	BTS-1000	
R44	1200Ω	½	181-0122	BTS-1200	
R45	330Ω	½	181-0331	BTS-330	
R46	1000Ω	½	181-0102	BTS-1000	
R47	10KΩ	½	181-0103	BTS-10K	
R48	6800Ω	½	181-0682	BTS-6800	
R49	22KΩ	½	181-0223	BTS-22K	
R50	15000Ω	½	181-0152	BTS-15000	
R51	1800Ω	½	181-0182	BTS-1800	
R52	470KΩ	½	181-0474	BTS-470K	
R53	18KΩ	½	181-0183	BTS-18K	
R54	12KΩ	½	183-0123		
R55	12KΩ	½	183-0123		
R56	12KΩ	½	183-0123		
R57	330KΩ	½	181-0334	BTS-330K	
R58	470KΩ	½	181-0474	BTS-470K	
R59	18KΩ	½	183-0183	BTS-18K	
R60	15KΩ	½	181-0153	BTS-15K	
R61	15KΩ	½	181-0153	BTS-15K	
R62	47KΩ	½	181-0474	BTS-47K	
R63	100KΩ	½	181-0104	BTS-100K	
R64	47KΩ	½	181-0474	BTS-47K	
R65	100KΩ	½	181-0104	BTS-100K	
R66	47KΩ	½	181-0474	BTS-47K	
R67	22KΩ	½	181-0223	BTS-22K	
R68	100KΩ	½	* 190-0013	BTS-100K	
R69	47KΩ	½	† 190-0006	BTS-47K	
R70	68KΩ	½	181-0683	BTS-68K	
R71	15 Meg	½	181-0156	BTS-15 Meg	
R72	220KΩ	½	181-0224	BTS-220K	
R73	100KΩ	½	181-0104	BTS-100K	
R74	100KΩ	½	181-0104	BTS-100K	
R75	180K 5%	½	181001945	BTS-180K 5%	
R76	68Ω	½	183-0680		
R77	47Ω	½	181-0470	BTS-47	
R78	680Ω	½	182-0103	BTA-10K	
R79	330Ω	½	182-0331	BTA-330	

ITEM No.	RATING OHMS	RATING WATTS	SYLVANIA PART No	IRC PART No.	NOTES
			REPLACEMENT DATA		
R80	33KΩ	2	183-0333	BTB-33K	
R81	33KΩ	2	183-0333	BTB-33K	
R82	33KΩ	1	181-0333	BTS-33K	
R83	100KΩ	½	181-0104	BTS-100k	
R84	470KΩ	½	181-0474	BTS-470K	
R85	820Ω	½	181-0182	BTS-1800	
R86	47KΩ	2	183-0473	BTB-47K	
R87	39KΩ	2	183-0393	BTB-39K	
R88	4700Ω	5	187-0017		
R89	330KΩ	1	181-0334	BTS-330K	
R90	470KΩ	1	181-0474	BTS-470K	
R91	2, 2 Meg	1	181-0225	BTS-2.2 Meg	
R92	33KΩ	1	181-0333	BTS-33K	
R93	10KΩ	1	181-0103	BTS-10K	
R94	470KΩ	1	181-0474	BTS-470K	
R95	470KΩ	1	181-0474	BTS-470K	
R96	15KΩ	2	183-0153	BTB-15K	
R97A	22KΩ	2		BTB-22K	
B	8200Ω	2	* 190-0007	BTB-8200	
C	8200Ω	2		BTB-8200	
R98	33KΩ	1	181-0333	BTS-33K	
R99	68KΩ	1		BTS-68K	
R100	680KΩ	1	181-0684	BTS-680K	
R101	330KΩ	1	181-0334	BTS-330K	
R102	680KΩ	1	181-0684	BTS-680K	
R103	100KΩ	1	181-0104	BTS-100K	
R104	10000		189-0030		
R105	2200Ω 5%	½	181-02225	BTS-2200 5%	
R106	2200Ω 5%	½	181-02225	BTS-2200 5%	
R107	1 Meg	½	181-0105	BTS-1 Meg	
R108	330KΩ	½	181-0334	BTS-330K	
R109	680KΩ	1	181-0684	BTS-680K	
R110	470KΩ	1	181-0474	BTS-470K	
R111	680Ω	1	183-0681	BTS-680	
R112	560Ω	1		BTS-560	
R113	560Ω	1		BTS-560	
R114	10000	1		BTS-10000	
R115	100KΩ	1	181-0104	BTS-100K	
R116	100KΩ	1	181-0104	BTS-100K	
R117	1 Meg	1	181-0105	BTS-1 Meg	
R118	470KΩ	1	181-0474	BTS-470K	
R119	330Ω	1	181-0331	BTS-330	
R120	33KΩ	2	183-0333	BTB-33K	
R121	10000Ω	1	181-0103	BTS-1000	
R122	8200Ω	1	181-0822	BTS-8200	
R123	15KΩ	1	182-0153	BTA-15K	
R124	470KΩ	1	181-0474	BTS-470K	
R125	22KΩ	1	181-0223	BTS-22K	
R126	150KΩ	1	181-0154	BTS-150K	
R127	82KΩ	1	181-0823	BTS-82K	
R128	4700Ω	1	181-0472	BTS-4700	
R129	10Ω	1	182-0100		
R130	470KΩ	1	181-0474	BTS-470K	
R131	100Ω	1	181-0101	BTS-100	
R132	100Ω	1	181-0101	BTS-100	
R133	15KΩ	2	181-0153	BTB-15K	
R134	100Ω	1	181-0101	BTS-100	
R135	100Ω	1	181-0101	BTS-100	
R136	15KΩ	2	181-0153	BTB-15K	
R137	4700Ω	2	183-0472	BTB-470	
R138	4.3Ω	1	189-0007		
R139	4.3Ω	2	189-0007		
R140	1 Meg	2		BTB-1 Meg	
R141	1 Meg	2		BTB-1 Meg	
R142	1 Meg	2		BTB-1 Meg	
R143	4.3Ω	1	189-0007		
R144	2000Ω	5	187-0005	1 3/4A-2000	
R145	220KΩ	1	181-0224	BTS-220K	
R146	270KΩ	2	189-0031	BTB-270K	
R147	270KΩ	2	189-0031	BTB-270K	
R148	68KΩ	2	189-0032	BTB-68K	

■ This is a voltage sensitive resistor (Globar type).
* Items R66, C73A, C73B, C73C are combined in one unit.
† Items R69, C74 are combined in one unit.
‡ Items R97A, R97B, R97C, C86A, C86B, C86C are combined in one unit.
Note 1. Some models may use a 2200Ω resistor in this application.

TRANSFORMER (POWER)

ITEM No	RATING PRI	RATING SEC 1	RATING SEC 2	RATING SEC 3	RATING SEC 4	RATING SEC 5	SYLVANIA PART No	Stancor PART No	Merit PART No	Triad PART No	RCA TYPE No	Hallderson PART No	Thordarson PART No	NOTES
							REPLACEMENT DATA							
T1	117VAC @ 2.72A	620VCT @ .330ADC	6VAC @ 6A				141-0037		P-3053 ① ② ③					
				6.3VAC @ 2.2A	6.3VAC @ 1.2A	6.3VAC @ 8A								

① Use low tape only on high voltage secondary.
② Parallel and phase 5 volt windings for Sec. 2.
③ Parallel and phase 6.3 volt ⑤ 7A windings for Sec. 4.
④ Use original unit.

TRANSFORMER (HALO LIGHT)

ITEM No	RATING PRI	RATING SEC 1	RATING SEC 2	SYLVANIA PART No	Stancor PART No	Merit PART No	Triad PART No	RCA TYPE No	Hallderson PART No	Thordarson PART No
				REPLACEMENT DATA						
T2	117VAC @1.1A	1600VAC		141-0037		P-3170 ① ④				

① Ignore Filament windings.
④ Mount differently.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No	USE	SYLVANIA PART No	Stancor PART No	Merit PART No	Triad PART No	RCA TYPE No	Hallderson PART No	Thordarson PART No
		REPLACEMENT DATA						
T3	Vert. Osc. Trans.	242-0002	A-8125	A-3003	A-97X	209T1 ①	B6702	24A87 ①
T4	Horiz. Output Trans.	241-0002						
T5	Vert. Output Trans.	241-0003	A-8142 ②	A-3028	A-108X	210T2	21B02	28S53
T8A	Yoke (90°) Horiz. (53MH)	300-0011 ③		MDF-90 ①	P-550-1	219D1 ④		Y-14
B	Vert. (47MH)							
T7	Horiz. Lin. Coil. (.6-4.3MH, tapped)	133-0003	WC-6	MWC-5 ⑤		209R1		WC-17

① Drill one new mounting hole.
② Drill new mounting holes.
③ Includes capacitor C120, and resistors R112, R113, R114
④ Use original yoke network
⑤ Enlarge mounting hole.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	SYLVANIA PART No	Stancor PART No	Merit PART No	Hallderson PART No	Thordarson PART No	NOTES
			REPLACEMENT DATA					
T8	4.7KΩ	3.4Ω	143.0023	A-3849	A-3019	S-52	Z1U02	28S49

SPEAKER

ITEM No.	RATINGS SIZE	FIELD	V. C. IMP.	SYLVANIA PART No	JENSEN PART No	QUAM PART No	NOTES
				REPLACEMENT DATA			
SP1	8"	PM	3.4Ω	539-0805	ST-115 Mod. P8-V	82 8A21	

COILS (RF-IF)

ITEM No.	USE	DC RES PRI.	DC RES SEC.	SYLVANIA PART No.	MEISSNER PART No	MERIT PART No	MILLER PART No	NOTES
				REPLACEMENT DATA				
L1	Ant. Trans.	0†CT	0†CT					
L2	Ant. Osc.	0Ω						
L3	UHF Input Coil	0Ω						Channel 13
L4	Ant. Coil	0Ω						
L5	Neutr. Coil	0Ω						
L6	RF Coil	0Ω						
L7	RF Coils	0Ω						
L8	Mixer Grid Coil	0Ω						Channel 13
L9	Mixer Grid Coils	0Ω						
L10	Fil. Choke	0Ω						
L11	Osc. Plate Coil	0†CT						Channel 13
L12	Osc. Coils	0Ω						
L13	Osc. Coil	0Ω						Channel 6
L14	Conv. Plate	.1Ω						
L15	1st Video IF	.1Ω		119-0002	17-4531 *		6232 ●	Includes trap
L16	2nd Video IF	.1Ω	.1Ω	119-0003	17-4531 ▲		6232	Includes trap
L17	3rd Video IF	.1Ω	.1Ω	119-0004			6233	Includes trap
L18	Fil. Choke	0Ω		147-0004		19-3001	6604	
L19	4th Video IF	.1Ω	.1Ω	119-0005	17-4531 *		6234	
L20	Cathode Trap	0Ω	0Ω	118-0011	20-1045		6219	
L21	5th Video IF	.1Ω	.1Ω	126-0001			6234 ▲	Includes 1N105 crystal detector
L22	Series Peaking Coil	1.5Ω		118-0010		19-1005	4613	8.6 Microhenries
L23A	Series Peaking Coil	5.5Ω		† 131-3006	19-3160	19-194	4644	180 Microhenries
B	Shunt Peaking Coil	8Ω			19-3300		6155	330 Microhenries
L24	4.5 MC Trap	5.5Ω		130-0001	20-1005	TV-151	1470	
L25A	Series Peaking Coil	5Ω		† 131-3007	19-3125	TV-194	6153	135 Microhenries
B	Shunt Peaking Coil	8Ω			19-3250	TV-185	6151	250 Microhenries
L26	Sound IF	5.5Ω		130-0001	1 1-2400	TV-151	1469	
L27	RF Choke	3.2Ω		146-0013	19-3093	TV-161	6177	56 Microhenries

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (cont)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	SYLVANIA PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L28	Ratio Det.	12Ω	1.5ΩCT	128-0008	17-3497	TV-115	6205	Tertiary winding= .95Ω
L29	Horiz. Discrim.	39Ω	85ΩCT	128-0009	20-1400 ▲	TV-160 ▲	6194 ▲	Cathode winding= 10Ω
L30	Ringing Coil	48Ω		146-0005	19-1575	TV-163	6210	
L31	RF Choke	1.5Ω		118-0010	19-1005		4612	9.6 Microhenries
L32	RF Choke	1.5Ω		118-0010	19-1005		4612	9.6 Microhenries
L33	RF Choke	1.5Ω		118-0010	19-1005		4612	9.6 Microhenries

† Both peaking coils wound on same form.
* Drill mounting holes and use secondary and trap windings.
■ Use secondary and trap windings.
▲ Drill mounting holes.
♦ Detune trap windings and drill mounting holes.
▬ Use adaptor plate and add 1N105 crystal detector externally.

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA					
	TOTAL DIRECT CURRENT	D.C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ∿)	SYLVANIA PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
L34	.330ADC	41.6Ω	1.26 Hy.	155-0008	C-2326 ①			C5037 ①	

① Drill one new mounting hole.

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			SYLVANIA PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG S/B	4/10 A 125V	191-0016	487-0008	313.400 (3AG S/B 4/10A)	351011	MDL4/10	4406

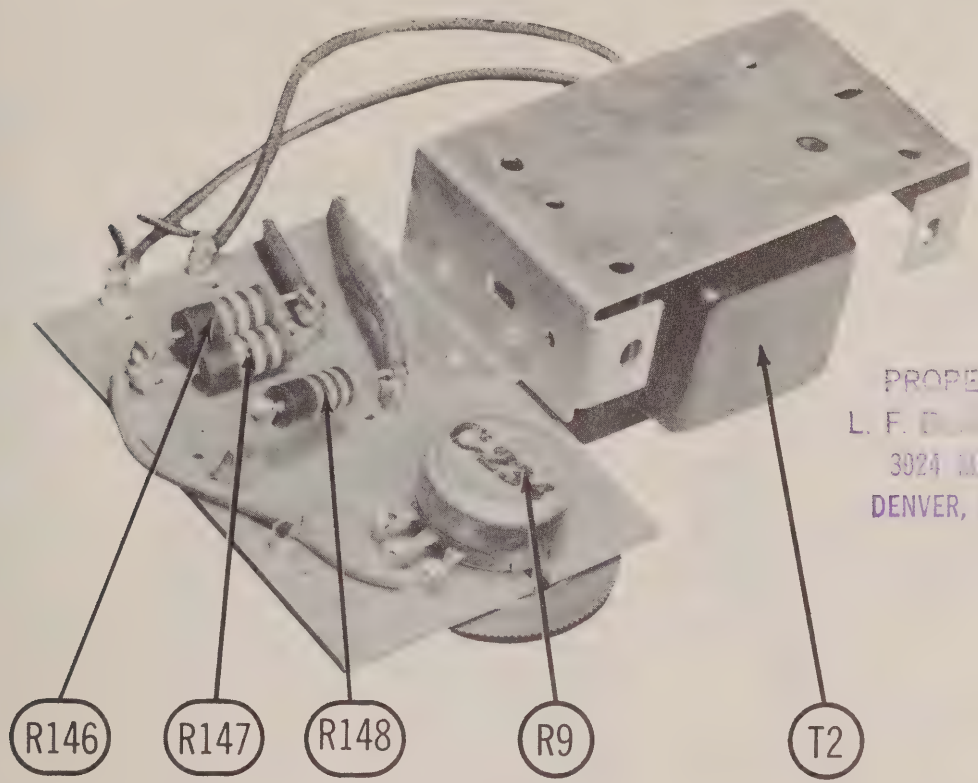
CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		SYLVANIA PART No.	SYLVANIA PART No.	FEDERAL PART No.	
M2	1N105	1N105	1N105		Video Detector

MISCELLANEOUS

ITEM No.	PART NAME	SYLVANIA PART No.	NOTES
M3	Dial Light	611-0047	#47 Bayonet
M4	Tube	611-2702	Cold cathode HaloLight *
M5	Tuner	323-0021	UHF Chassis 1-513-2 & 1-513-4
M6	Tuner	323-0039	VHF
M7	Switch	573-0005	Horiz. Size
M8	Regulator Tube	40B2	Horiz. Output
M9	Focus Magnet	400-0018	Includes centering device
M10	Ion Trap	400-0017	
M11	Correction Magnet	400-0019	3 used
	Knob	743-0027	Channel Selector & VHF dial 331 Series
	Knob	743-0026	Channel Selector & VHF dial 336 Series
	Knob	740-0029	Fine tuning
	Knob	744-0021	HaloLight * control
	Knob	744-0023	Brightness
	Knob	744-0022	Volume
	UHF Dial	722-0027	1-513-2, 1-513-4 Chassis
	UHF Dial	722-0028	Dummy 1-513-1, 1-513-3 chassis
	Escutcheon	714-0028	Knob
	Escutcheon	714-0029	Knob & prism assembly
	Safety Glass	710-0010	

* Sylvania Trademark



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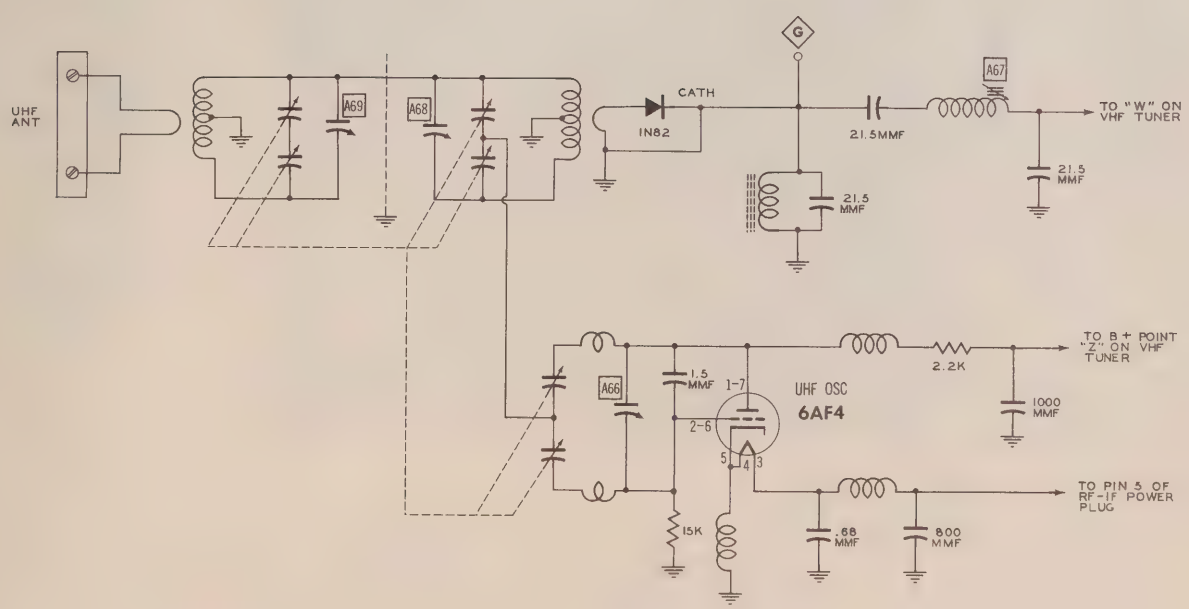
HALOLIGHT CONTROL UNIT



A PHOTOFACT STANDARD NOTATION SCHEMATIC

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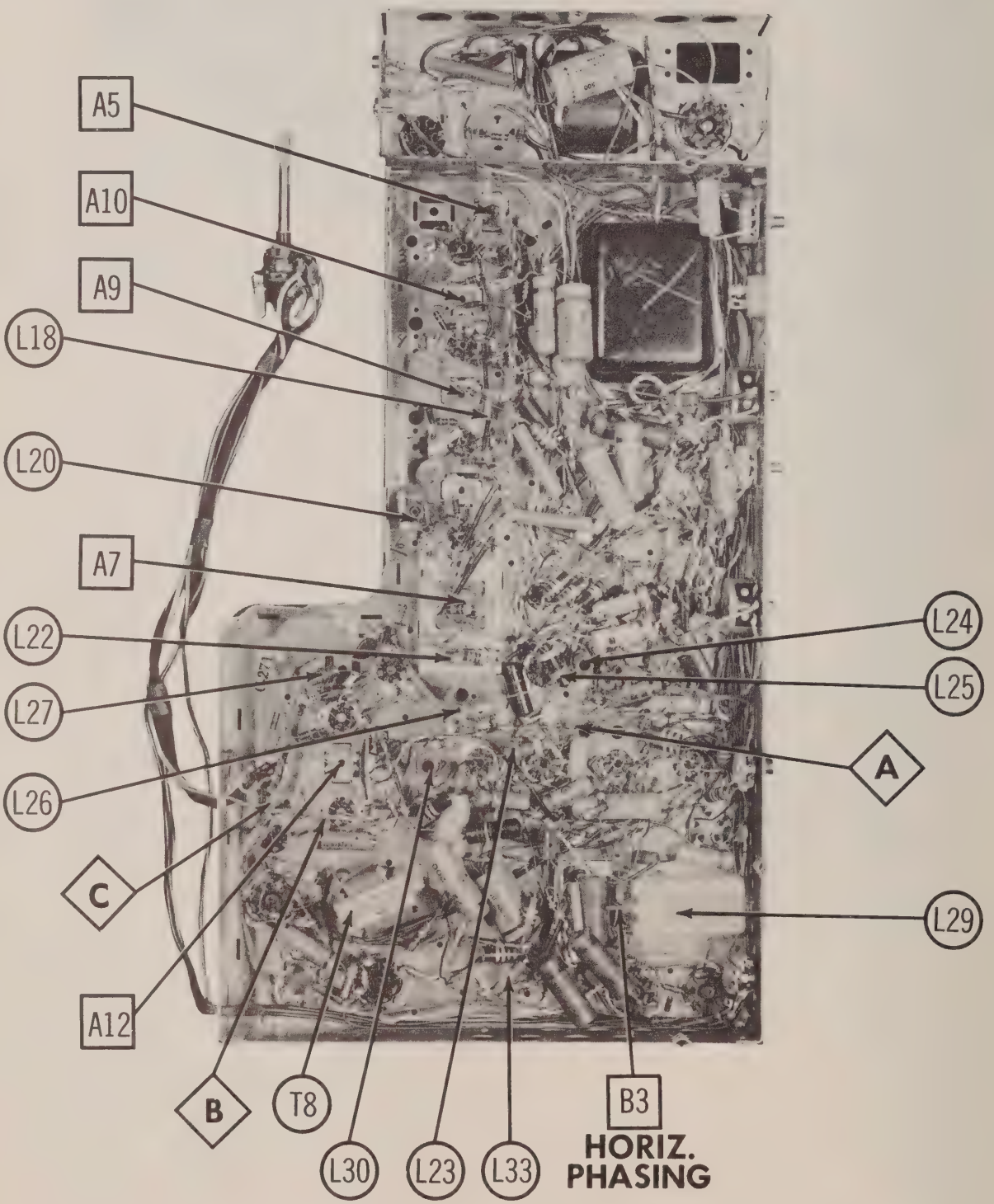
UHF TUNER USED IN SOME MODELS

UHF TUNER SCHEMATIC



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

TROUBLE SHOOTING AIDS (cont)

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POWER

DEAD SET

If filaments fail to light, check AC interlock assembly. Check switch on volume control and T1. If filament light, substitute V28 and V29, Check B+ filter decoupling network.

SMALL AND/OR DIM PICTURE

Substitute V28 and V29. Check B+ filter decoupling network.

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V21, V22, V23, V24, V25, V26, V27 and M8. Check waveform W18. Check M1.

If Satisfactory	If Unsatisfactory
Check T4, T6A, C117, C7, C115, C116, R133, R136, and other associated components.	Check L30, R127, C105, C106, C103, R126 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V21, V22, V23, V24, V25, V28 and V29. Check horizontal output and damper stages for component failure or change of value. Check B+ power supply.

BLOOMING

Check by substitution V22, V23, V26, V27, V28 and V29. Check T4, T6A and other associated components.

GENERAL

RASTER – SOUND – NO PICTURE

Follow procedure outlined under "Loss of Video".

RASTER – PICTURE – NO SOUND

Follow procedure outlined under "Weak or No Sound".

RASTER – NO SOUND – NO PICTURE

Check by substitution V1, V2, V3, V4, V5, V6 and V7. Check video and video IF components.

NO RASTER – SOUND – HIGH VOLTAGE

Check R103, and R108 for open. If open, sound and high voltage will be satisfactory. Video waveform will be present at pin 11 of V30.

NO RASTER – NO SOUND

Follow procedure outlined under "Dead Set".

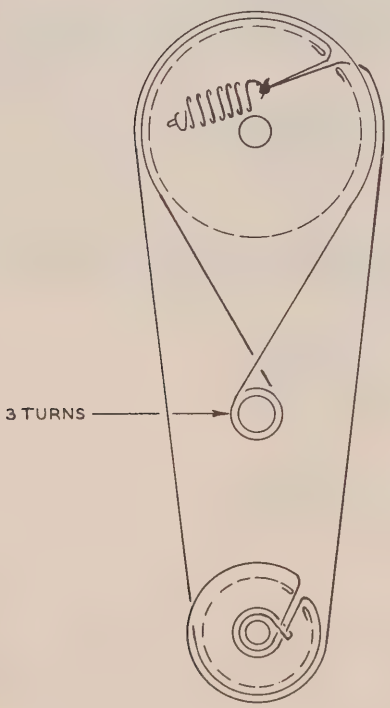
KEYSTONE EFFECT

Check T6 deflection yoke and it s associated components.

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.



UHF DRIVE CORD STRINGING

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removing the channel selector and fine tuning knobs.

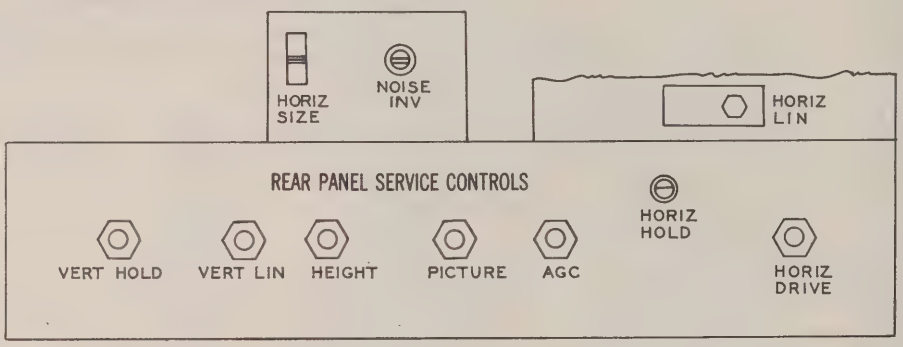
PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass remove four (4) wood screws holding wood strip at the top of safety glass. Remove wood strip and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION



SPECIAL ADJUSTMENTS

AGC CONTROL ADJUSTMENT AND NOISE INVERTER CONTROL ADJUSTMENT

See Horizontal Sweep Circuit adjustment on page 13.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the horizontal oscillator circuit can be made from rear panel of the chassis. Adjust the horizontal hold slug (L29) until picture synchronizes horizontally. If results cannot be obtained by the above adjustment see horizontal sweep circuit adjustment on page 13

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary (L28) located on top of chassis. (See tube placement chart).

FUSES

One fuse is used for horizontal sweep circuit protection.(For location see tube placement chart.)

CENTERING

Centering is accomplished mechanically by means of a centering lever on the PM focusing assembly. Adjust the centering lever from side to side, and up and down until the picture is properly centered.

ANTI-PIN CUSHION ADJUSTMENT

Reduce the picture size so that the sides of the raster are visible, and position the magnets so that all sides are straight lines and the corners are at right angles.

DISASSEMBLY INSTRUCTIONS

MAIN CHASSIS

1. Remove 5 push-on type control knobs from front panel.
2. Disconnect built-in antenna.
3. Remove 10 wood screws. Remove rear cover.
4. Disconnect speaker, HaloLight * plug, two tuner plugs, horizontal and vertical yoke plugs, CRT socket and HV lead. (Remove screw from HV lead support).
5. Remove one nut. Remove off/on volume and brightness control.
6. Remove 4 chassis bolts. Remove chassis.

REMOVAL OF TUNER (Separate from main chassis)

1. Remove tuner plugs from main chassis.
2. Remove ground clamp from CRT support rod.
3. Remove 2 wood screws. Remove antenna bracket.
4. Remove channel selector pilot light from bracket.
5. Remove 3 screws. Remove tuner from cabinet.

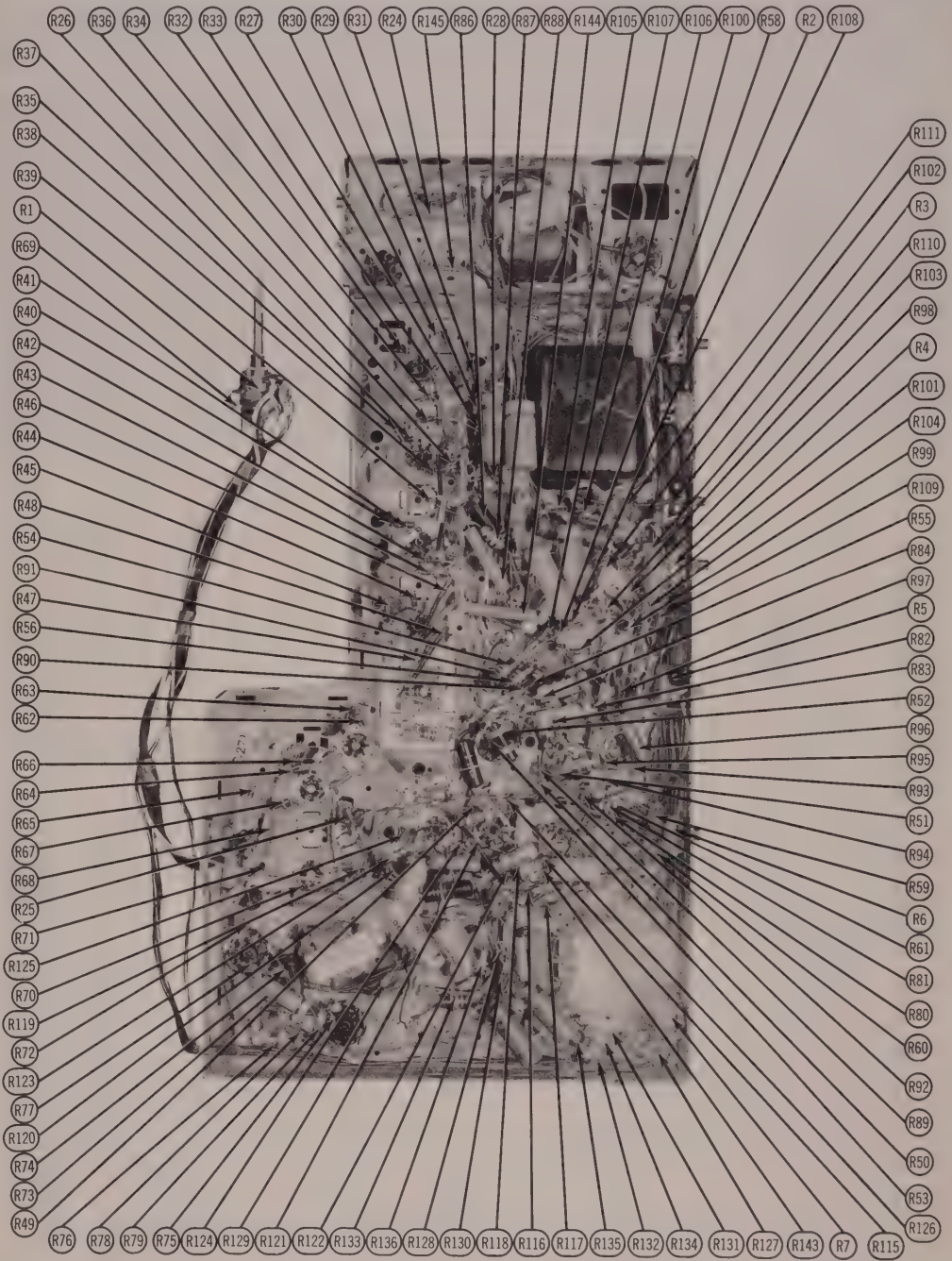
SPEAKER

1. Remove 4 speaker nuts. Remove speaker (not necessary for chassis removal).

HALOLIGHT* CONTROL UNIT

1. Disconnect HaloLight * plug from control unit.
2. Remove power plug from main chassis.
3. Remove 2 wood screws. Remove HaloLight* control unit.

* Sylvania Trademark



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

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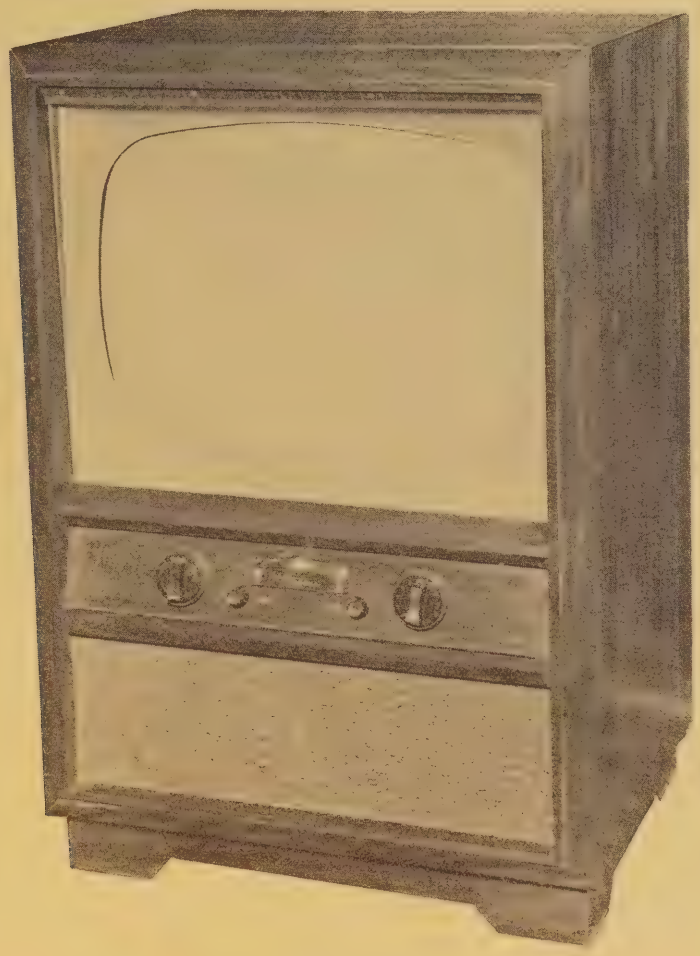

MODEL 2D1359A

TRUETONE
MODEL 2D1359A (Series A, C, D, E)

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TRUETONE
MODEL 2D1359A (Series A, C, D, E)

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MODEL 2D1359A (Series A, C, D, E)

TRUETONE
MODEL 2D1359A (Series A, C, D, E)

TRADE NAME	Truetone Model 2D1359A (Series A, C, D, E)
SUPPLIER	Western Auto Supply Co. 2107 Grand Ave., Kansas City, Mo.
TYPE SET	Television Receiver
TUBES	Twenty-one
POWER SUPPLY	110-120 Volts AC-60 Cycle RATING 2.26 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 VHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

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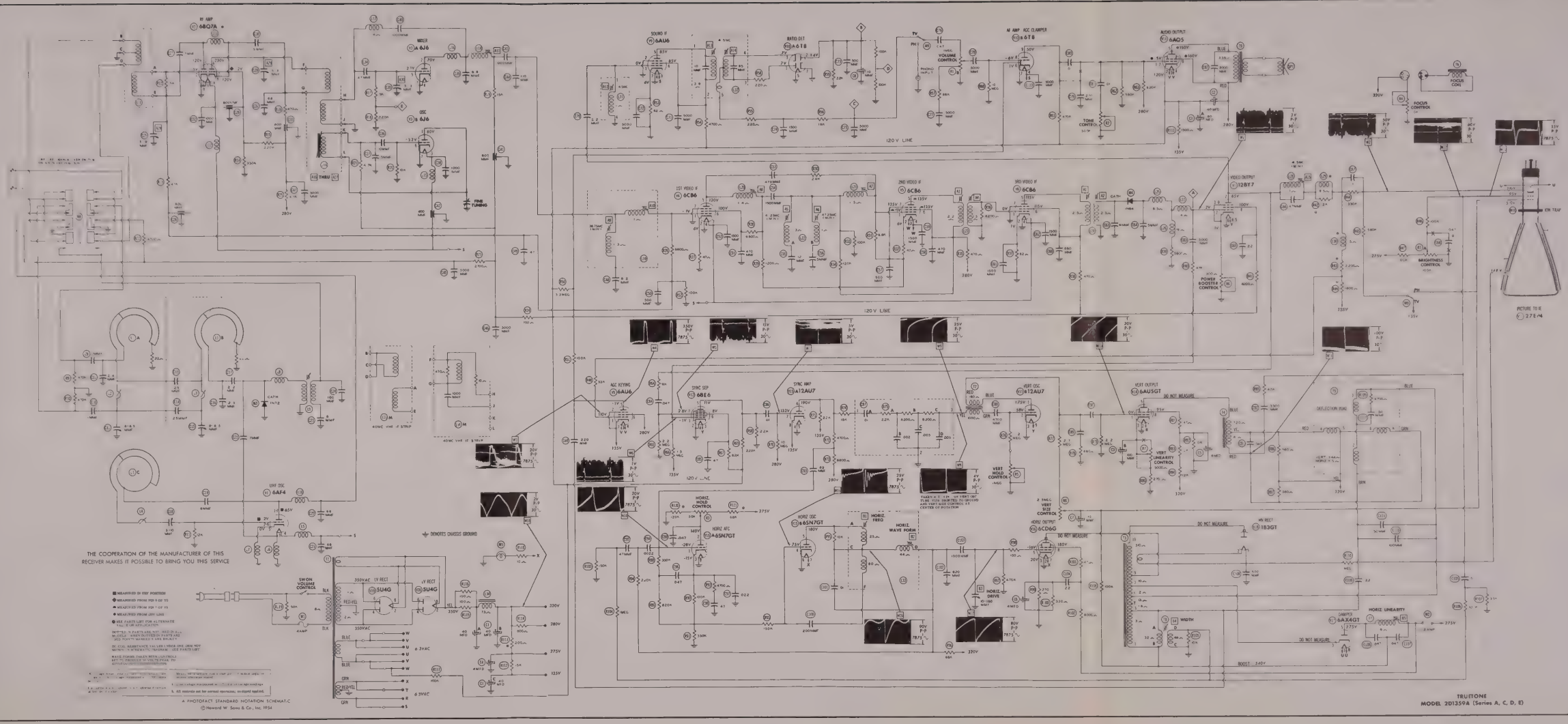
TRUETONE
MODEL 2D1359A (Series A, C, D, E)
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
A PHOTOFACT STANDARD NOTATION SCHEMATIC
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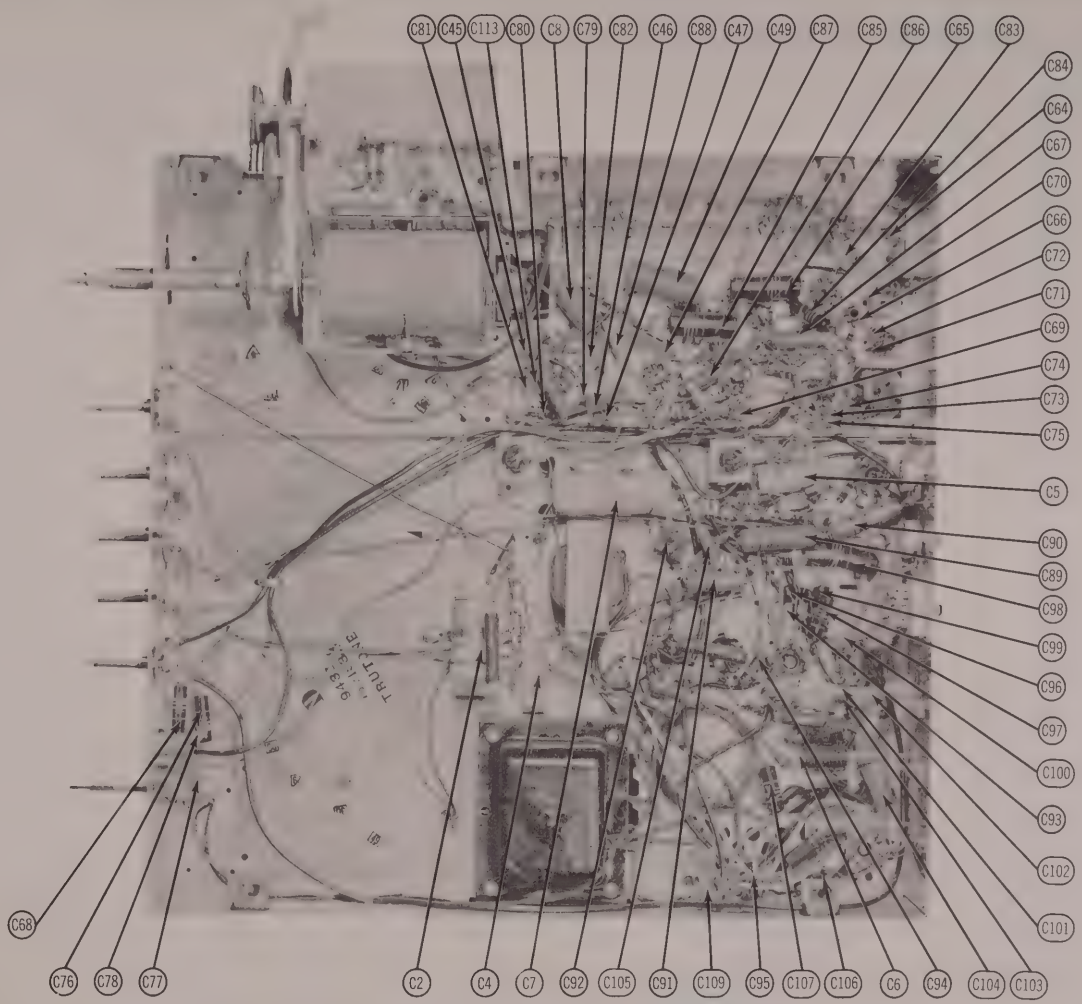
TRUETONE
MODEL 2D1359A (Series A, C, D, E)

TRUETONE
MODEL 2D1359A (Series A, C, D, E)

PROPERTY OF
L. F. BLANKENSHIP
392[illegible] MEADE ST.
DENVER, COLORADO

CHASSIS TOP VIEW

TRUETONE
MODEL 2D1359A (Series A, C, D, E)



CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

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TUBE PLACEMENT CHART

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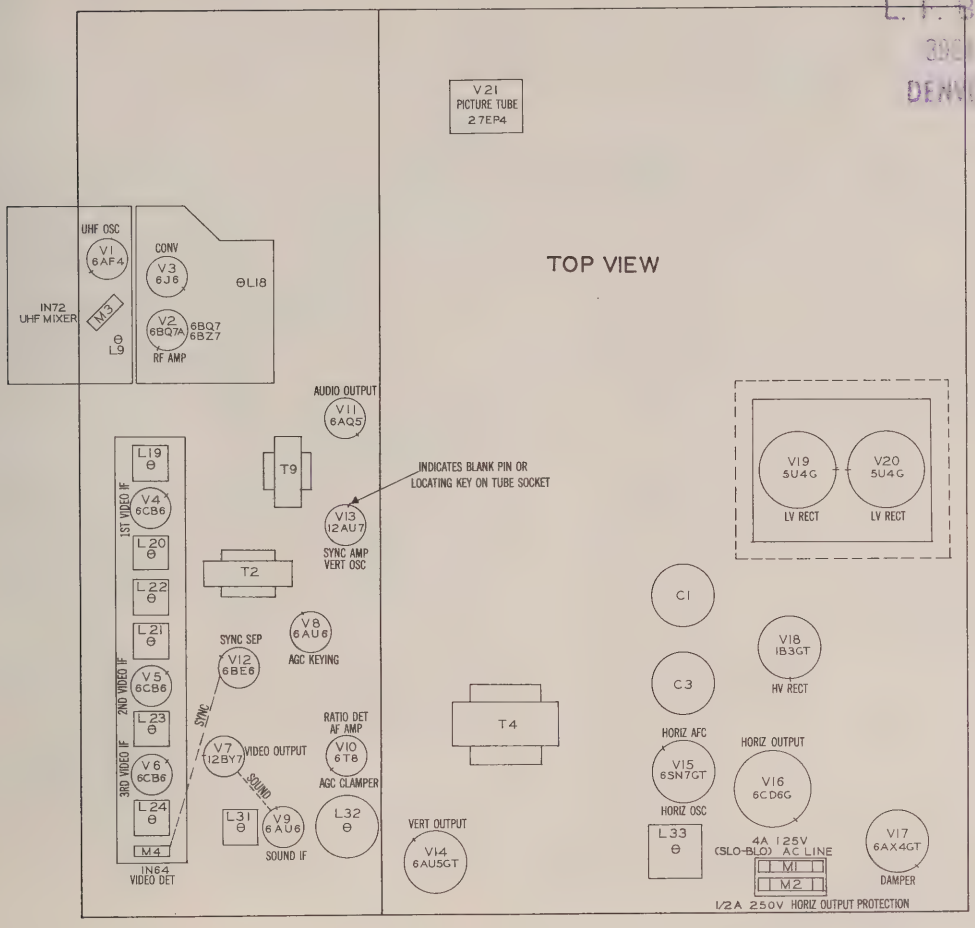

TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - V19, V20, Fuse (M1)

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V3, V4, V5, V6, V7, V11, (V1 UHF only)
No pic, no sound, has snow - V2, V3, V4
No pic, has sound, has raster - V7, V21
Has pic, no sound - V9, V10, V11
Overloaded picture - V8, V10

SYNC FAILURE
No vert. sync V13
No horiz. sync - V13, V15
No vert. or horiz. sync - V12, V13

SWEEP FAILURE
No raster, has sound - V15, V16, V17, V18, V21, Fuse (M2)
No vertical deflection - V13, V14
Poor vert. linearity or foldover - V13, V14
Poor horiz. linearity or foldover - V15, V16, V17
Narrow picture - V15, V16, V17, V18, V19, V20
Vert. off freq. - V13
Horiz. off freq. - V13, V15

TRUETONE
MODEL 2D1359A (Series A, C, D, E)

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped and kept away from the chassis. Do not remove the horizontal oscillator tube (V15) to disable the high voltage.

VIDEO IF ALIGNMENT

The local oscillator may be disabled by placing a piece of transparent cellulose tape on the first two contacts (from front of drum assembly) of any channel strip and then switching the tuner to the insulated strip. Disabling the local oscillator reduces the possibility of erroneous indications. The local oscillator may also be disabled by removing any oscillator channel strip and switching tuner to that channel.
The antenna terminals should be shorted with a jumper wire. Use only enough sweep generator output to provide useable pattern on scope.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	.01MFD	High side to pin 1 (grid) of 6CB6 (V6). Low side to chassis.	43.5MC (10MC Swp)	42MC 45MC	Any	Vert. Amp. thru 10KΩ to point Ⓐ. Low side to chassis.	A1, A2	Detune 2nd IF transformer by connecting an alligator clip to pin 5 (plate) of 6CB6 (V5). Adjust for response similar to Fig.1. Remove alligator clip from pin 5 of V5.
2.	"	High side to pin 1 (grid) of 6CB6 (V5). Low side to chassis.	"	42.0MC 43.5MC 44.9MC	"	"	A3, A4	Connect the negative lead of a 3 volt bias battery to the ungrounded side of C49. Connect the positive lead to chassis. Adjust for response similar to Fig.2.
3.	"	High side to pin 1 (grid) of 6CB6 (V4). Low side to chassis.	Not used	41.25MC (Unmod)	"	Use VTVM. DC probe thru 10KΩ to point Ⓐ. Common to chassis.	A5	Disconnect bias battery. Adjust for MINIMUM deflection.
4.	"	"	"	47.25MC	"	"	A6	"
5.	"	"	43.5MC (10MC Swp)	42.5MC 44.5MC	"	Vert. Amp. thru 10KΩ to point Ⓐ. Low side to chassis.	A7, A8	Reconnect bias battery as in step 2. Adjust for response similar to Fig. 3.
6.	Direct	High side to an ungrounded tube shield floating over converter tube (V3). Low side to chassis.	Not used	39.75MC (Unmod)	"	Use VTVM. DC probe thru 10KΩ to point Ⓐ. Low side to chassis.	A9	Disconnect bias battery. Adjust for MINIMUM deflection.
7.	"	"	44MC (10MC Swp)	42.5MC 44.5MC	"	Vert. Amp. thru 10KΩ to point Ⓐ. Low side to chassis.	A10, A11	Reconnect bias battery as in step 2. Adjust for response similar to Fig.4.
8.	"	"	"	39.75MC 41.25MC 45.75MC 47.25MC	"	"		Check for response curve similar to Fig.5. If necessary, retouch A1 thru A4, A7, A8, A10 and A11 to obtain desired response. To observe the 39.75MC and 47.25MC markers disconnect the bias battery, increase scope gain and sweep generator output. If necessary, repeat steps 4 and 6.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 100KΩ (±1%) resistors in series from point Ⓑ to chassis. The junction of these two resistors is alignment point Ⓓ as shown on the schematic.
Set contrast control fully counter clockwise.
Remove any video IF amplifier tube (V4, V5 or V6) from its socket.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
9.	.001MFD	High side to point Ⓐ. Low side to chassis.	4.5MC (Unmod)	Any	DC probe thru 10KΩ to point Ⓑ.	A12, A13	Adjust for maximum deflection.
10.	"	"	"	"	DC probe thru 10KΩ to point Ⓒ. Common to point Ⓓ.	A14	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. For final adjustment of A14 restore set to normal operating condition and tune in a TV station. Adjust A14 for MINIMUM buzz and clearest sound.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60% modulation and 450KC sweep. Use 120% sawtooth voltage in scope for horizontal deflection.
Set contrast control fully counter clockwise.
Remove any video IF amplifier tube (V4, V5 or V6) from its socket.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9.	.001MFD	High side to point Ⓐ. Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any	Vert. Amp. thru 10KΩ to point Ⓑ. Low side to chassis.	A12, A13	Disconnect stabilizing capacitor C8. Adjust for curve of maximum amplitude and symmetry similar to Fig. 6.
10.	"	"	"	"	"	Vert. Amp. thru 10KΩ to point Ⓒ. Low side to chassis.	A14	Reconnect stabilizing capacitor C8. Adjust so that 4.5MC occurs at center of crossover lines as in Fig.7. SLIGHTLY retouch A13 for maximum amplitude and straightness of crossover lines. For final adjustment of A14 restore set to normal operating condition and tune in a TV station. Adjust A14 for MINIMUM buzz and clearest sound.

FIG.1

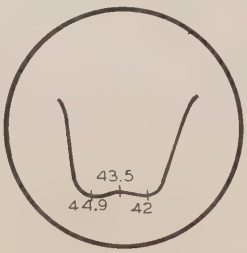

FIG.2

FIG.3

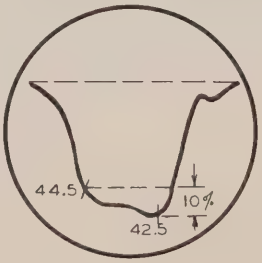

FIG.4

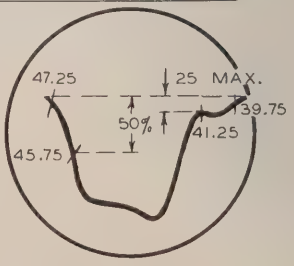

FIG.5

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ALIGNMENT INSTRUCTIONS (cont)

4.5MC TRAP ALIGNMENT

Set contrast control fully counter clockwise . Remove any video IF amplifier tube (V4, V5, or V6) from its socket.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
11.	.001MFD	High side to point (A). Low side to chassis.	4.5MC (Unmod)	Any	DC probe thru detector (Fig.8) to pin 11 (cathode) of picture tube. Common to chassis.	A15	Adjust for MINIMUM deflection. Replace the video IF amplifier (V4, V5 or V6) in its socket.

OSCILLATOR ALIGNMENT

The channel oscillator adjustment screws are reached thru a hole just to the right of the channel switch shaft. The correct adjustment screw is accessible thru this hole as the channel switch is turned to each channel.
Connect the bias supply as in step 2 of "Video IF Alignment".
Remove the insulating tape (or replace channel strip) placed over the two terminals on the channel strip.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
12.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	207MC (10MC Swp)	205.25MC 209.75MC	12	Vert. Amp. thru 10KΩ to point (A). Low side to chassis	A16	Adjust to place sound marker in trap notch as in Fig.9. Video marker should be at 50%.
			213MC (10MC Swp)	211.25MC 215.75MC	13		A17	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A18	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A19	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A20	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A21	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A22	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A23	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A24	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A25	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A26	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A27	

RF AND MIXER ALIGNMENT

Connect the bias supply as in step 2 of "Video IF Alignment".
Connect a .001MFD capacitor across the vertical amplifier input terminals of scope.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
13.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	207MC (10MC Swp)	205.25MC 209.75MC	12	Vert. Amp. thru 10KΩ to point (E). Low side to chassis.	A28 A29 A30	Adjust for response curve similar to Fig. 10 with markers above 90%.
14.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		Check for response curve similar to Fig. 10. If markers fall below 70% on any channel make compromise adjustment of A28, A29 and A30 with channel switch set to that channel, then recheck all other channels to see that they have not been seriously affected.
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
			85MC (10MC Swp)	83.25MC 87.75MC	6			
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

UHF TUNER ALIGNMENT

The UHF tuner has been properly aligned at the factory and is very stable. If this portion of the receiver should ever require alignment or major repair, the entire unit should be disconnected and returned to the factory.

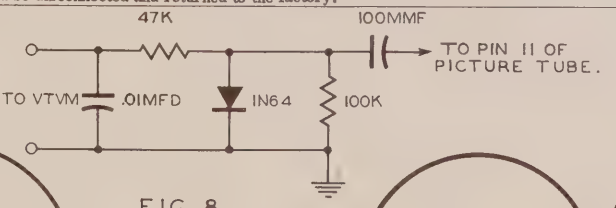


FIG. 8

FIG. 6

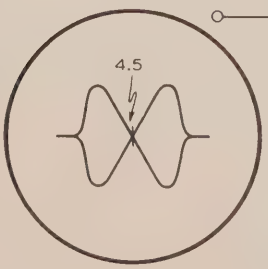


FIG. 7

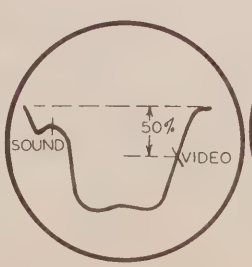


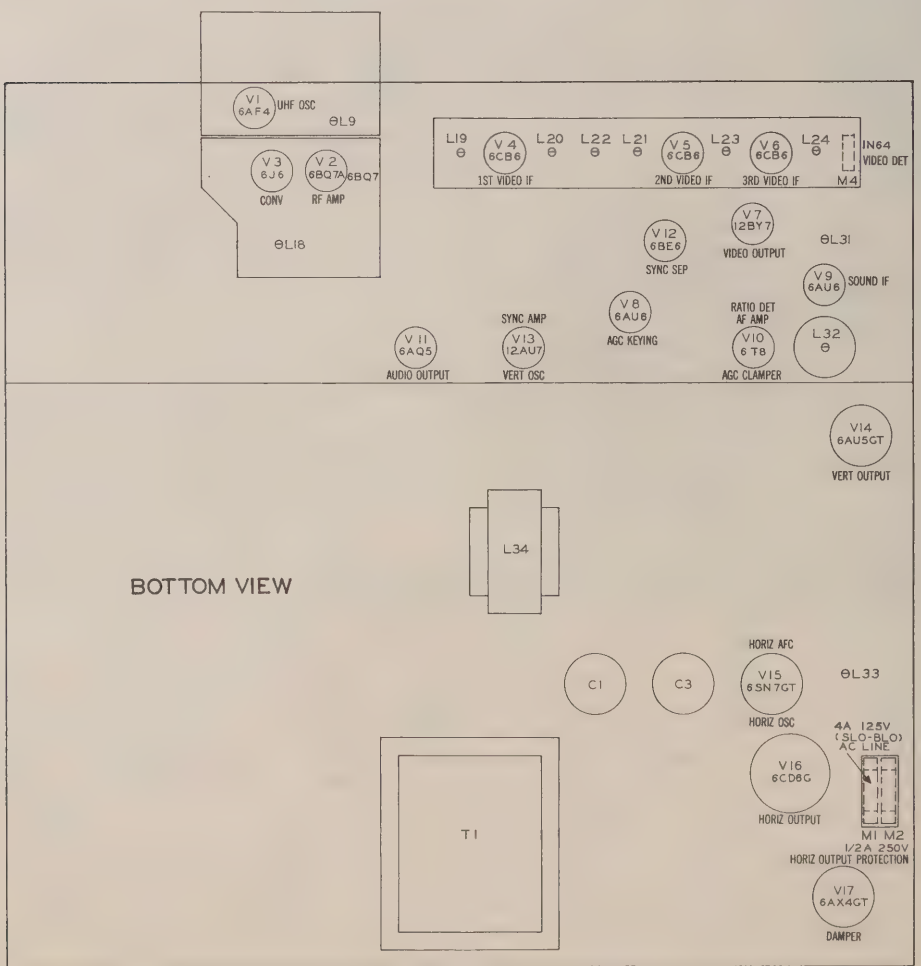
FIG. 9

FIG. 10

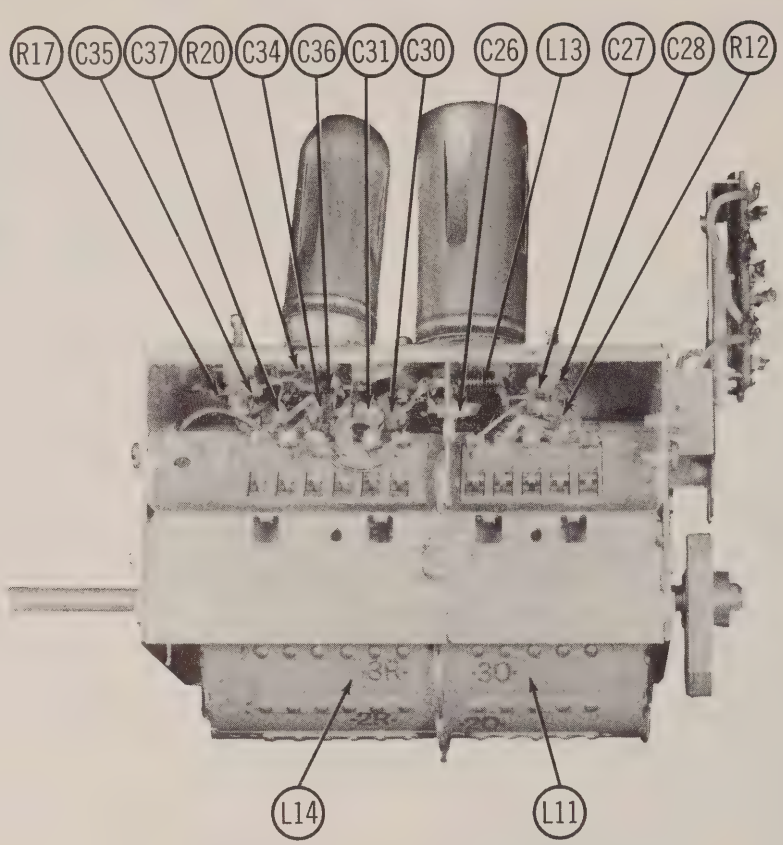
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AF4	■▲2.8KΩ	12KΩ	0Ω	.1Ω	0Ω	12KΩ	■▲2.8KΩ		
V 2	6BQ7A	INF	150KΩ	0Ω	.1Ω	0Ω	†5.9KΩ	150KΩ	INF	0Ω
V 3	6J6	▲4.8KΩ	▲15KΩ	.1Ω	0Ω	235KΩ	10KΩ	0Ω		
V 4	6CB6	107KΩ	47Ω	0Ω	.1Ω	♦1.2KΩ	♦17KΩ	0Ω		
V 5	6CB6	♦6.8KΩ	♦47Ω	▲100KΩ	▲100KΩ	†1.2KΩ	†1.2KΩ	70KΩ		
V 6	6CB6	1.5Ω	82Ω	.1Ω	0Ω	▲470Ω	▲470Ω	0Ω		
V 7	12BY7	200Ω	5.6KΩ	200Ω	.1Ω	.1Ω	0Ω	†14KΩ	▲8.2KΩ	200Ω
V 8	6AU6	†45KΩ	†10KΩ	▲100KΩ	▲100KΩ	200KΩ	†720Ω	†10KΩ		
V 9	6AU6	1Ω	0Ω	.1Ω	0Ω	▲4.7KΩ	▲4.7KΩ	82Ω		
V 10	6T8	INF	22KΩ	INF	.1Ω	0Ω	100KΩ	0Ω	10Meg	▲470KΩ
V 11	6AQ5	400KΩ	†11.5KΩ	▲100KΩ	▲100KΩ	†1.1KΩ	†720Ω	400KΩ		
V 12	6BE6	†1.5Meg	0Ω	.1Ω	0Ω	22KΩ	▲82KΩ	2.2Meg		
V 13	12AU7	▲4Meg	2.2Meg	0Ω	0Ω	0Ω	†10KΩ	†10Meg	†10KΩ	.1Ω
V 14	6AU5GT	2.2Meg	0Ω	600Ω	9KΩ	†875Ω	INF	.1Ω	†19KΩ	
V 15	6SN7GT	1.5Meg	†90KΩ	430KΩ	480KΩ	†70KΩ	0Ω	.1Ω	0Ω	
V 16	6CB6G	INF	0Ω	150Ω	470KΩ	470KΩ	†8.5KΩ	.1Ω	†8.5KΩ	TOP CAP ▲10Ω
V 17	6AX4GT	150Ω	INF	1Meg	INF	†335Ω	INF	▲100KΩ	▲100KΩ	
V 18	1B3GT		PINS	1 - 8	HAVE	INF	RESISTANCE			TOP CAP ▲520Ω
V 19	5U4G	INF	10KΩ	INF	12Ω	INF	11Ω	INF	10KΩ	
V 20	5U4G	INF	10KΩ	INF	12Ω	INF	11Ω	INF	10KΩ	
V 21	27EP4	▲100KΩ	†180KΩ	PIN 10 ▲100KΩ	PIN 11 †350KΩ	PIN 12 ▲100KΩ				

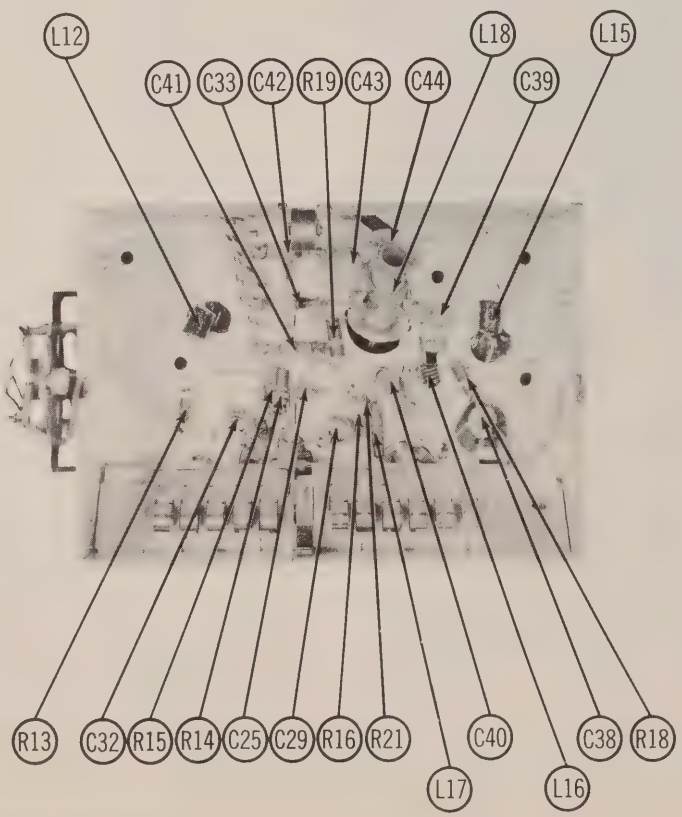
■ MEASURED IN UHF POSITION
▲ MEASURED FROM 120V LINE
† MEASURED FROM PIN 8 OF V20
♦ MEASURED FROM PIN 2 OF V5
▲ MEASURED FROM PIN 3 OF V17



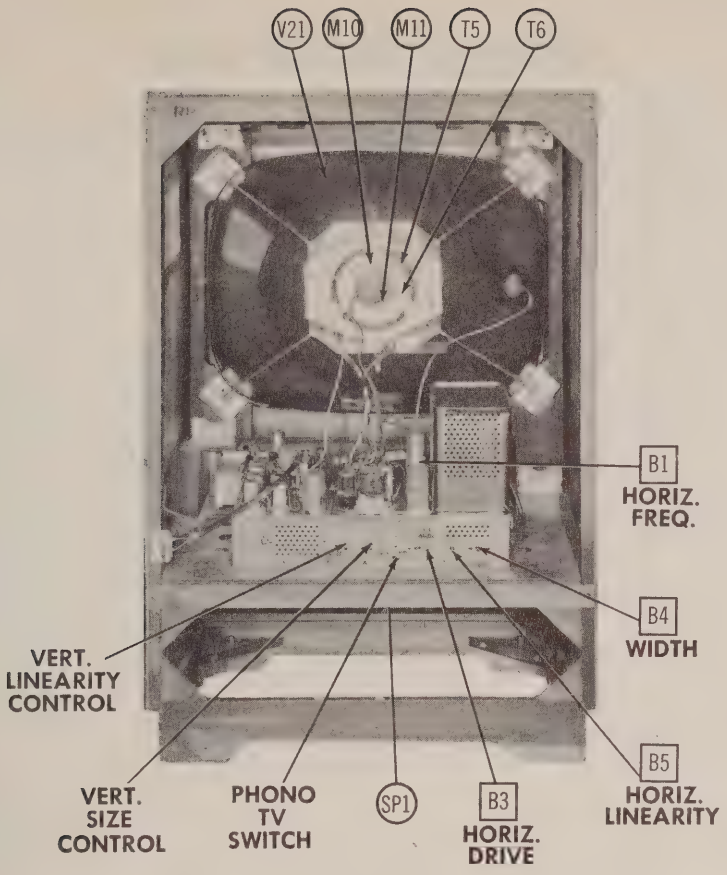
TUBE PLACEMENT CHART



VHF TUNER-RIGHT SIDE



VHF TUNER-BOTTOM VIEW



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CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.

(1) Set the horizontal frequency slug (B1) and the horizontal waveform slug (B2) fully counter clockwise .

(2) Short terminal "C" to terminal "D" on L33.

(3) Turn horizontal drive trimmer (B3) fully clockwise then turn $\frac{1}{2}$ turn counter clockwise.

(4) Set the horizontal hold control fully clockwise .

(5) Adjust B1 until picture locks in horizontally .

(6) Remove short from terminals "C" and "D" on L33. If necessary, adjust B2 until picture locks in .

(7) Connect the vertical amplifier of an oscilloscope to terminal "C" of L33. Connect low side to chassis. Adjust B2 for waveform similar to Fig. 11.

(8) Set horizontal hold control counter clockwise and adjust B1 until picture locks in and remains in sync when switching off channel and back again. Adjust B1 slowly counter clockwise until picture is just ready to lose sync.

(9) Check for proper horizontal hold action as follows:

(a) Turn the horizontal hold control fully counter clockwise. Switch off channel and back again. Picture may remain in or be just out of sync.

(b) Turn horizontal hold control fully clockwise. Switch off channel and back again. Picture may lose sync.

(c) With horizontal hold control in its mid-range position the picture should remain in sync when switching off channel and back again.

Adjust the horizontal drive trimmer (B3) counter clockwise as far as possible without the presence of vertical white lines or compression near the center of the picture.

Adjust the width slug (B4) for a picture that is slightly wider than necessary to fill the picture mask horizontally.

Adjuskt the horizontal linearity slug (B5) for a picture that is symmetrical from left to right.

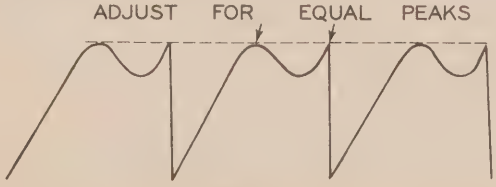


FIG. 11

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V15, V16 and V17. Check waveform W17.

If Satisfactory	If Unsatisfactory
Check T3, T5A, T7, T8, R101, R102, C110, C111, C7 and other associated components.	Check C103, C102, R97, R98, R99, R100 and other associated components.

DRIVE LINES

Check adjustments B3 and B5. Check by substitution V16 and V17. Check T3, T5A, C106, C107, R102 and other associated components.

COMPRESSED LEFT SIDE

Check by substitution V15, V16 and V17. Check components associated with the horizontal output and damper stages especially T3 and T5A.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check by substitution V15 and V16. Check T3 and T5A for internal arcing. Check L33 and other associated components.

XMAS TREE EFFECT

Substitute V15. Check L33, C101, C100, R93, R91 and other associated components.

VERTICAL

LOSS OF SWEEP

Check by substitution V13 and V14. Check waveform W10.

If Satisfactory	If Unsatisfactory
Check T4, T5B, R84, R83, R81 and other associated components.	Check C89, C88, C90, R77, R78, R8 and other associated components.

INSUFFICIENT SWEEP

Check vertical size and vertical Linearity Controls for proper adjustment. Proceed as outlined under "Loss of Sweep".

COMPRESSED AT BOTTOM

Check by substitution V13 and V14. Check R8, T2, R7, R80, C5, C89 and other associated components.

COMPRESSED AT TOP

Check by substitution V13 and V14. Check R8, R76, R78, R80, C3B, C89 and other associated components.

FOLDS

Check by substitution V13 and V14. Check C3B, T5B, T4, R86, R87, R83, R84 and other associated components.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Check by substitution V12 and V13A. Check C84, C86, R64, R67, R71, R69 and other associated circuit components.

LOSS OF VERTICAL SYNC-HORIZONTAL SYNC SATISFACTORY

Check by substitution V13 and V14. Check waveform W8.

If Satisfactory	If Unsatisfactory
Check R5, R76, C88, T2, and other associated components.	Check vertical integrator and other associated components. Check IF stages for overloading.

LOSS OF HORIZONTAL SYNC-VERTICAL SYNC SATISFACTORY

Check by substitution V15 and V16. Check waveform W15.

If Satisfactory	If Unsatisfactory
Check components associated with V15 especially T3, C100 and R96.	Check R120, R121, R3, C101, C97, C93, C99 and other associated components.

HORIZONTAL BENDING

Check by substitution V7, V12, V13 and V15. Check horizontal AFC network for component failure or change of value.

VIDEO

LOSS OF VIDEO

Substitute V7. Check coupling networks to picture tube. Check picture tube and other components associated with V7.

SOUND BARS(4.5MC BEAT)

Adjust tuner fine tuning for best sound and picture. Check adjustment A15 and video IF alignment.

POOR CONTRAST

Substitute V7. Check video detector crystal. Check contrast control, picture tube and other associated circuit components.

NEGATIVE PICTURE

Check by substitution V4, V5, V6 and V7. Check AGC network. Check video detector crystal. Check picture tube.

SMEAR

Substitute V7. Check L29, L28, L30, L26, C67, R44 and other associated components.

WIDE BLACK BAR ACROSS PICTURE

Check V4, V5, V6, V7 and V2 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V9, V10A and V11. Check stages V10A and V11 with audio signal generator. Apply audio signal across R60.

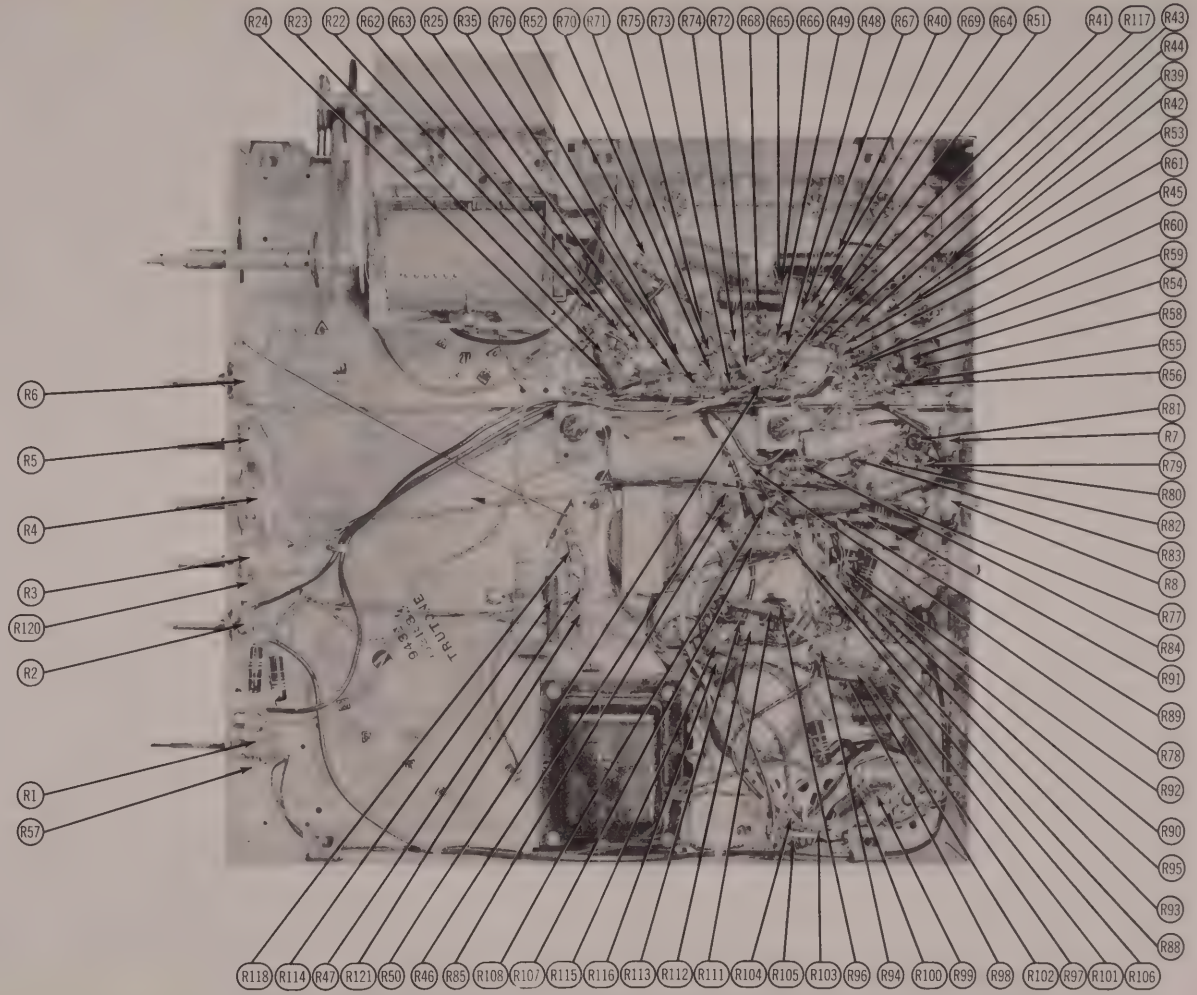
If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF alignment and components.	Check C80, C81, C82, R63, R61, T9 and other associated components.

BUZZ

Adjust tuner fine tuning for best sound and picture. Adjust A14 for minimum buzz. Substitute V10. Check alignment of IF stages.

DISTORTED

Follow procedure outlined under "Weak or No Sound".



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

PROPERTY OF
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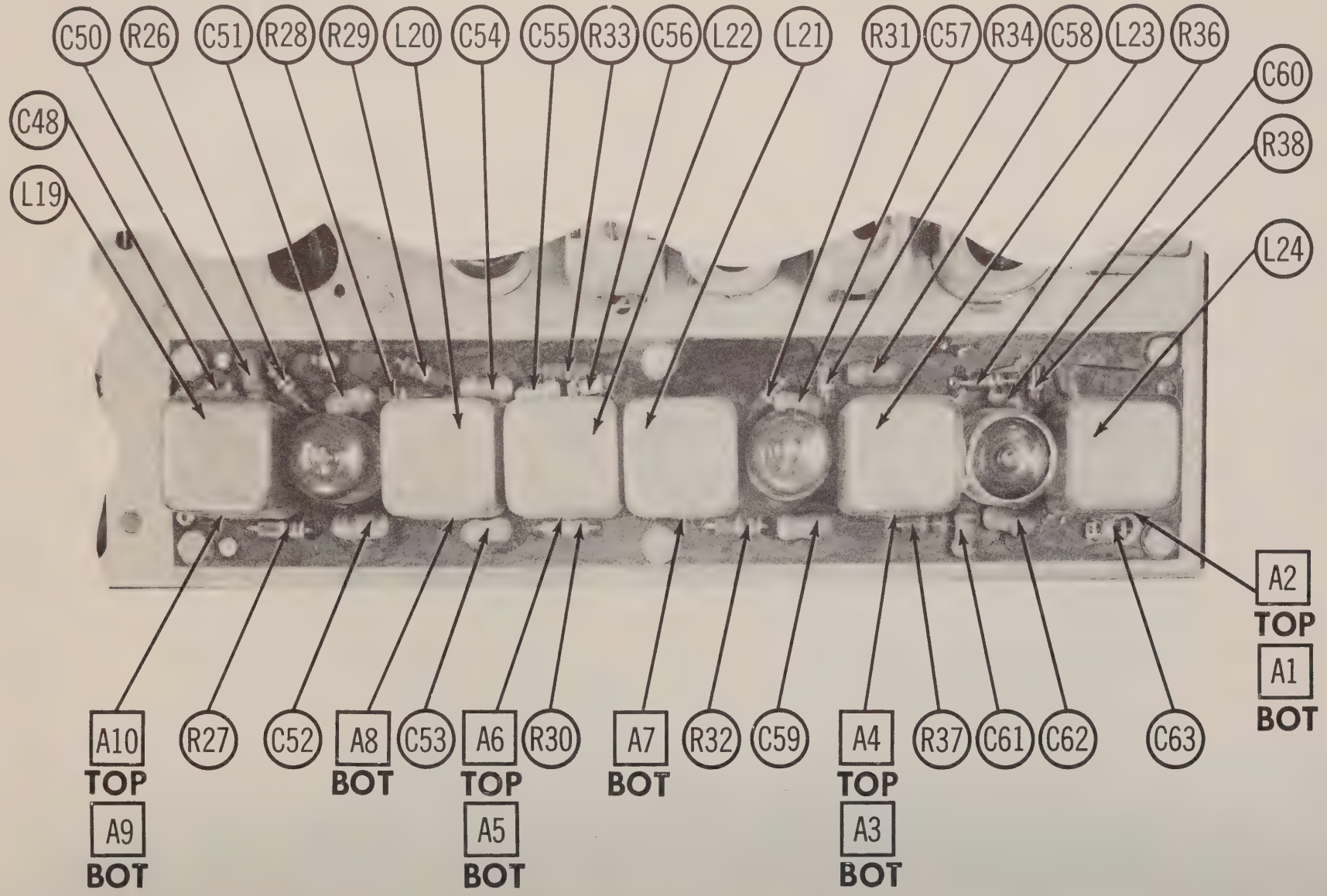
3924 MEADE ST.
DENVER, COLORADO



VIDEO IF STRIP – TOP VIEW

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		TRUETONE PART No.	STANDARD REPLACEMENT		
V1	UHF Oscillator	6AF4	6AF4	7DK	
V2	RF Amplifier	6BQ7A	6BQ7A	9AJ	
	RF Amplifier	6BQ7	6BQ7	9AT	Alternate
	RF Amplifier	6BZ7	6BZ7	9AJ	Alternate
V3	Converter	6J6	6J6	7BF	
V4	1st. Video IF Amp.	6CB6	6CB6	7CM	
V5	2nd. Video IF Amp.	6CB6	6CB6	7CM	
V6	3rd. Video IF Amp.	6CB6	6CB6	7CM	
V7	Video Output	12BY7	12BY7	9BF	
V8	AGC Keying	6AU6	6AU6	7BK	
V9	Sound IF Amp.	6AU6	6AU6	7BK	
V10	Ratio Det.-AF Amplifier-AGC Clamper	6T8	6T8	9E	
V11	Audio Output	6AQ5	6AQ5	7BZ	
V12	Sync Separator	6BE6	6BE6	7CH	
V13	Sync Amplifier-Vert. Oscillator	12AU7	12AU7	9A	
V14	Vert. Output	6AU5GT	6AU5GT	6CK	
V15	Horiz. AFC - Horiz. Oscillator	6SN7GT	6SN7GT	8BD	
V16	Horiz. Output	6CD6G	6CD6G	5BT	
V17	Damper	6AX4GT	6AX4GT	4CG	
V18	HV Rectifier	1B3GT	1B3GT	3C	
V19	LV Rectifier	5U4G	5U4G	5T	
V20	LV Rectifier	5U4G	5U4G	5T	

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CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA					RETMA BASE TYPE	NOTES
	TRUETONE PART No.	CBS-HYTRON PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.		
V21	27EP4	27EP4	27EP4	27GP4		12D	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	TRUETONE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	▲40	450	508072	AFH3-44		C035		FP377	TVL-3787	
B	▲40	450								
C	■40	450								
C2	40	300	160095	PRS450/40		BR4035		TC78	TVA-1611	
C3A	▲80	250	509002	AFH3-142		C109		FP375	TVL-3764	
B	▲100	50								
C4	4	450	504719	PRS450/4		BR445		TC70	TVA-1702	
C5	8	300	507386	PRS350/8		BR835		TC61	TVA-1603	
C6	4	150	520921	PRS150/4		BR415		TC40	TVA-1402	
C7	10	600	508680	PRS600/10		BRHV610		TC92	R1222	
C8	10	150	505174	PRS150/12		BR1015		TC42	TVA-1406	
C9	1			SI1NP0	TCZ-1	TZ03	NP0K-010		5TCCB-V1	
C10	1			SI1NP0	TCZ-1	TZ03	NP0K-010		5TCCB-V1	
C11	2.4									
C12	.8-6.5									
C13	.25									
C14	.25									
C15	.8-6.5									
C16	2.5									
C17	2.2			SI2.2NP0	TCZ-2.2	TZ05	NP0K-2R2		5TCCB-V22	
C18	3-10									
C19	6									
C20	68			SI68	D6-680	TP32	GP1K-680	UC-5468	5GA-Q68	
C21	68			SI68	D6-680	TP32	GP1K-680	UC-5468	5GA-Q68	
C22	.7									
C23	8									
C24	100									
C25	3-9		509064		829-10					
C26	800			EF-001	MFT-1000				503C-D1	
C27	3		513453	SI3NP0	TCZ-3	Z007	NP0K-030	ZT-5533	5TCCB-V33	
C28	800			EF-001	MFT-1000				503C-D1	
C29	.5-3		509063		829-3		3115-01-0R5	CT565A		
C30	1.5		513033	SI1.5NP0	TCZ-1.5	Z004	NP0K-1R5	ZT-5515	5TCCB-V15	
C31	68		513040	SI68	D6-680	G038	811-680	UC-5468	5GA-Q68	
C32	1000		513041	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C33	800			EF-001	MFT-1000				503C-D1	
C34	47		520719	BPD-000047	D6-470	G033	801-470	UC-5447	5GA-Q47	
C35	.5-3		509063		829-3		3115-01-0R5	CT565A		
C36	10		513437	SI10NP0	TCZ-10	Z018	NP0K-100	ZT-541	5TCC-Q1	
C37	5		513450							
C38	1000		513041	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C39	6.8		513451	SI6.8NP0	TCZ-6.8	Z013	NP0K-6R8	ZT-5568	5TCCB-V68	
C40	1000		513041	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C41	800			EF-001	MFT-1000				503C-D1	
C42	800			EF-001	MFT-1000				503C-D1	
C43	1000		513009	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C44	110		513452			G043	GP2K-111			
C45	5000		513013	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C46	5000		513013	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C47	5000		513013	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C48	8.2		513455	SI8.2NP0						
C49	.47	200	512239	P288-47		CUB2P47		PT4047	2TM-P47	
C50	1500		513038	SI1500	D6-152	TP54	GP2L-152	UC-5215	5HK-D15	
C51	470		513037	SI470	D6-471	TP46	GP2K-471	UC-5347	5GA-T47	
C52	1500		513038	SI1500	D6-152	TP54	GP2L-152	UC-5215	5HK-D15	
C53	470		513037	SI470	D6-471	TP46	GP2K-471	UC-5347	5GA-T47	
C54	1500		513038	SI1500	D6-152	TP54	GP2L-152	UC-5215	5HK-D15	
C55	12		513448				N330K-120			
C56	5		513449				N330K-050			
C57	1500		513038	SI1500	D6-152	TP54	GP2L-152	UC-5215	5HK-D15	
C58	470		513037	SI470	D6-471	TP46	GP2K-471	UC-5347	5GA-T47	
C59	1500		513038	SI1500	D6-152	TP54	GP2L-152	UC-5215	5HK-D15	

PROPERTY OF
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DENVER, COLORADO

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No	RATING CAP	RATING VOLT	TRUETONE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C60	680		513044	S1680	DS-681	TP50	GP2K-681	UC-5368	5GA-T68	
C61	1500		513038	SU500	DS-152	TP54	GP2L-152	UC-5318	5HK-D5	
C62	1500		513038	SU500	DS-152	TP54	GP2L-153	UC-5218	5HK-D15	
C63	4		512454			2009	NP0K-040			
C64	5		513432	SI5NP0	TCZ-4.7	Z0U	NP0K-050	ZT-555	5TCCB-V47	
C65	.22	200	512238	P288-22		CUB22P1		PT4022	2TM-P22	
C66	47		512238	S147NP0	TCZ-47	TZ22	NP0K-470	ST-5447	5TCC-Q47	
C67	.1	200	512216	P288-1	DF-104	CUB2P1		PT401	2TM-P1	
C68	.047	200	512203	P288-047	DF-103	CUB2S47		PT4147	2TM-S47	Note 1
C69	220	1000	513032	HYD15-00022		VT22	IR5KV-221	MCK322	10GA-T22	
C70	2.2		513001	SI2.2NP0	TCZ-2.2	TZ05	NP0K-2R2		5TCCB-V22	
C71	5000		513013	BPD-005	DD-502	K080	5U-005	DC-525	5HK-D5	
C72	5000		513013	BPD-005	DD-502	K080	5U-005	DC-525	5HK-D5	
C73	1500		513010	SU1500	D6-152	TP54	GP2L-152	UC-5218	5HK-D15	
C74	1500		513010	SU1500	D6-152	TP54	GP2L-153	UC-5218	5HK-D15	
C75	5000		513013	BPD-005	DD-502	K080	5U-005	DC-525	5HK-D5	
C76	.047	200	512233	P288-047	DF-503	CUB2S47		PT4147	2TM-S47	
C77	5000		513013	BPD-005	DD-502	K080	5U-005	DC-525	5HK-D5	
C78	5000		513013	BPD-005	DD-502	K080	5U-005	DC-525	5HK-D5	
C79	270		513006	SI270	D6-271	VT41	GP3K-271	UC-5337	5GA-T27	
C80	.01	400	512205	P488-01	D6-103	CUB4S1	GP2-333-103	PT411	4TM-S1	
C81	.01	400	512205	P488-01	D6-103	CUB4S1	GP2-333-103	PT411	4TM-S1	
C82	5000		513013	BPD-005	DD-502	K080	5U-005	DC-525	5HK-D5	
C83	5000		513013	BPD-005	DD-502	K080	5U-005	DC-525	5HK-D5	
C84	.047	200	512233	P288-047	DF-503	CUB2S47		PT4147	2TM-S47	
C85	47	200	512239	P288-47		CUB2P47		PT4047	2TM-P47	
C86	.01	600	512205	P688-01	D6-103	CUB6S1	GP2-333-103	PT611	6TM-S1	
C87A	.01					K082	5U-01	DC-511		
B	.002		*508062	*PA-111	*PC-101	K072	501-002	DC-522	*V-2	
C	.005					K080	5U-005	DC-525		
D	.005					K080	5U-005	DC-525		
C88	4700	1000	513533							
C89	.1	600	512218	P688-1	DF-104	CUB6P1		PT601	6TM-P1	
C90	.1	600	512218	P688-1	DF-104	CUB6P1		PT601	6TM-P1	
C91	.047	600	512237	P688-047	DF-503	CUB6S47		PT6147	6TM-S47	
C92	3300	500	512520			UR3D33				
C93	82		513018	SI82		D6-820	G04O	GP1K-820	UC-5482	5CA-Q82
C94	.0022	400	512232	P488-0022		D6-222	CUB4D22	GP2-333-222	PT4D22	4TM-D22
C95	47	1000	513030	HYD15-000047			VQ47	IR5KV-470	10GA-Q47	
C96	.047	200	512233	P288-047	DF-503		CUB2S47		PT4147	2TM-S47
C97	.022	400	512223	P488-023	DF-203		CUB4S22	417-03	PT4223	4TM-S22
C98	.47	200	512239	P288-47			CUB2P47		PT4047	2TM-P47
C99	.047	600	512236	P688-047	DF-503		CUB6S47		PT6147	6TM-S47
C100	200		513427					M330-333-201		
C101	.01	600	512211				IR5T02			
C102	820	500	512547							
C103	1000		513009	SU1000		D6-102	TP52	GP2L-102	UC-521	5HK-D1
C104	.22	400	512223	P488-22			CUB4P22		PT4223	4TM-P22
C105	.01	200	512204	P488-01		D8-103	CUB4S1	GP2-333-103	PT411	4TM-S1
C106	.047	400	512236	P488-047			CUB4S47		PT4147	4TM-S47
C107	.047	400	512236	P488-047			CUB4S47		PT4147	4TM-S47
C108	500	30000	521727			TY5-503	MMU30T5			30DX-T5
C109	.22	400	512223	P488-22			CUB4P22		PT4022	4TM-P22
C110	100	3000	513043	HYD30-0001				3KV-101		30GA-T1
C111	150	2000	513042	HYD30-00015						20GA-T15
C112	150	3000	513043	HYD30-00015						30GA-T15
C113	5000		513013	BPD-005		DD-502	K080	5U-005	DC-525	5HK-D5

Note 1. Not used in all Models.
* Items C87A, C87B, C87C, C87D, R75A, R75B, R75C are combined in one unit.

CONTROLS

ITEM No	RATING RESISTANCE	RATING WATTS	TRUETONE PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	10.5KΩ	½	521080	*QJ-471	RTV-426		UF15L	Brightness (Panel)
B	1 Meg	½					UR15T25 †	Volume tapped at 200K (Rear)
C	Switch						UB-28	Attach to R1B
R2A	500KΩ	½	520748	QU-133	A47-500K-S	AB-59	U-50	Tone
B	Shaft		Not Req.	Not Req.	KS8-3	AK-4	Not Req.	Attach to R2A
R3A	50KΩ	½	521059	QU-123	A47-50K-S	AB-31	U-35	Horiz. Hold
B	Shaft		Not Req.	Not Req.	KS8-3	AK-4	Not Req.	Attach to R3A
R4A	20KΩ	4	521727	4WK-20K	A10-20K	SVP-495	MOUMDPK	Focus - wire wound
B	Shaft		Not Req.	Not Req.	KS8-3	AK-4	Not Req.	Attach to R4A
R5A	1 Meg	½	521058	QU-137	A47-1 Meg-S	AB-49	U-54	Vert. Hold
B	Shaft		Not Req.	Not Req.	KS8-3	AK-4	Not Req.	Attach to R5A
R6A	200Ω	½	521057	QU-103	A47-500K-S	AB-6	RS00L	Power booster
B	Shaft		Not Req.	Not Req.	KS8-3	AK-4	DB-58	Attach to R6A
R7A	5000Ω	½	520945	QU7-114	A47-5000-S	AB-12	SU-14	Vert. Linearity
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R7A
R8A	2.5Meg	½	520944	QU-139	A47-2.5Meg-S	AB-33	SU-565	Vert. Size
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R8A

* CONCENTRIKIT EQUIVALENT KIT K-2 BASE ELEMENTS & SHAFTS BU-128 & P1-123 (Panel)
BI3-137X RI-218 (Rear)& Switch TS-1
† Universal replacement (Mallory exact duplicate Part No. UE1240S)

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA TRUETONE PART No	REPLACEMENT DATA IRC PART No.	NOTES
R9	470KΩ	½		BTS-470K	
R10	470KΩ	½		BTS-470K	
R11	12KΩ	½		BTS-12K	
R12	15KΩ	½	510158	BTS-15K	
R13	47KΩ	½	510167	BTS-47K	
R14	330KΩ	½	510181	BTS-330K	
R15	220KΩ	½	510179	BTS-220K	
R16	470Ω	½	510131	BTS-470	
R17	15KΩ	½	510158	BTS-15K	
R18	220KΩ	½	510179	BTS-220K	
R19	15KΩ	½	510158	BTS-15K	
R20	10KΩ	½	510155	BTS-10K	
R21	4700Ω	½	510149	BTS-4700	
R22	4700Ω	2	510348	BTB-4700	
R23	2700Ω	2	510344	BTB-2700	
R24	100Ω	½	510118	BTS-100	
R25	4700	2	510348	BTB-4700	
R26	68000	½	510151	BTS-6800	
R27	470	½	510113	BTS-47	
R28	68000	½	510151	BTS-6800	
R29	1200Ω	½	510138	BTS-1200	
R30	24KΩ 5%	½	510783	BTS-24K 5%	
R31	68000	½	510151	BTS-6800	
R32	47Ω	½	510112	BTS-47	
R33	100KΩ	½	510178	BTS-100K	
R34	120KΩ	2	510174	BTB-130K	

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS (cont)

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA TRUETONE PART No.	REPLACEMENT DATA IRC PART No.	NOTES
R35	470Ω	½	510130	BTS-470	
R36	8200Ω	½	510153	BTS-8200	
R37	82Ω	½	510117	BTS-82	
R38	470Ω	½	510131	BTS-470	
R39	5600Ω	½	510150	BTS-5600	
R40	47KΩ	½	510166	BTS-47K	
R41	68000	½	510153	BTS-8200	
R42	12KΩ 5%	½	510733	BTS-12K 5%	Note 2
R43	2200Ω	½			Note 2
R44	330KΩ	½		BTS-330K	
R45	560KΩ	½	510186	BTS-560K	
R46	100KΩ	½	510172	BTS-100K	
R47	100KΩ	½	510172	BTS-100K	
R48	33KΩ	½	510163	BTS-33K	
R49	1800Ω	½		BTS-1800	Note 3
R50	3.3 Meg	½	510701	BTS-3.3 Meg	
R51	100KΩ	½	510172	BTS-100K	
R52	100KΩ	½	510172	BTS-100K	
R53	82Ω	½	510117	BTS-82	
R54	4700Ω	1	510249	BTA-4700	
R55	220Ω	½	510124	BTS-220	
R56	18KΩ	½	510169	BTS-18K	
R57	68KΩ	½	510169	BTS-68K	
R58	220Ω	½	510134	BTS-220	
R59	220KΩ	½	510180	BTS-220K	
R60	10 Meg	½	510697	BTS-10 Meg	
R61	470KΩ	½	510184	BTS-470K	
R62	300KΩ 5%	½	510778	BTS-560K 5%	
R63	820KΩ 5%	½	510747	BTS-820K 5%	
R64	10KΩ	½	510159	BTS-10K	
R65	2.2 Meg	½	510193	BTS-2.2 Meg	
R66	1.5 Meg	½	510753	BTS-1.5 Meg	
R67	22KΩ	½	510171	BTS-22K	
R68	22KΩ	½	510160	BTS-22K	
R69	220KΩ	½	510178	BTS-220K	
R70	10 Meg	½	510197	BTS-10 Meg	
R71	22KΩ	½	510160	BTS-22K	
R72	4700Ω	1	510248	BTA-4700	
R73	6800Ω	1	510251	BTA-6800	
R74	18KΩ	½	510159	BTS-18K	
R75A	22KΩ			BTS-22K	
B	R3000		* 500062	BTS-8200	
C	R2000			BTS-5600	
R76	1.2 Meg 5%	½	510777	BTS-1.2 Meg 5%	
R77	2.7 Meg 5%	½	510772	BTS-2.7Meg 5%	

* Items R75A, R75B, R75C, C87A, C87B, C87C, C87D are combined in one unit.
Note 1. Some models may use a 15KΩ resistor in this application.
Note 2. Some models may use a 3900Ω resistor in this application.
Note 3. Some models may use a 1500Ω resistor in this application.
Note 4. Some models may use a 400Ω resistor in this application.
Note 5. Some models may use a 68KΩ resistor in this application.
Note 6. Some models may use a 22KΩ resistor in this application.

TRANSFORMER (POWER)

ITEM No	RATING PRI	RATING SEC 1	RATING SEC 2	RATING SEC 3	RATING SEC 4	RATING SEC 5	REPLACEMENT DATA TRUETONE PART No	Stancor PART No	Merit PART No	Triad PART No	RCA TYPE No	Halldorson PART No	Thordarson PART No
T1	117VAC @ 2.26A	630VCT @ .270ADC	5VAC @4A	6.3VAC @3A	12.6VCT @ 4.2A		521725						

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No	USE	REPLACEMENT DATA TRUETONE PART No.	Stancor PART No	Merit PART No	Triad PART No	RCA TYPE No	Halldorson PART No	Thordarson PART No
T2	Vert. Osc. Trans.	520980	A-8125	A-3003	A-97X	209T1 ①	H6702	24A87 ①
T3	Horiz.Output Trans.	521735 ②		A-3035 ③	D-50 * ③	235T1* ③		F-LY-16 * ③
T4	Vert. Output Trans.	520975 ④	A-8115 ⑤	A-3035 ⑤	A-107X ⑥		21800 ⑤	24S86 ⑤
T5A	Yoke (90°) Horiz. (52MH)	515423 ⑦		MDF-90 ⑦	Y-50-1 ⑦	215D1 ⑦		Y-14 ⑦
B	Vert. (47MH)							
T6	Focus Coil	182326 ⑧						
T7	Horiz.Lin.Coil(.3-10MH)	520981 ⑨	WC-8	MWC-6 ⑬	WC-12 ⑬	213R1		WC-17
T8	Width Coil(.8-34MH)	508987 ⑩	WC-5 ⑭	MWC-1 ⑭	WC-11 ⑭	216R1 ⑭	RF800	WC-20 ⑭
	With AFC Sec.(3.4-11MH)							

① Drill one new mounting hole.
② Includes resistor R10.
③ Drill new mounting holes.
④ Includes terminal strip and connectors for yoke leads, part #521095.
⑤ Connect as auto transformers.
⑥ Includes leads, connectors, capacitor C112 and resistor R109.
⑦ Use original yoke network.
⑧ Includes cable and plug.
⑨ Includes core and mounting clip.
⑩ Enlarge mounting hole.
⑪ Connect to coded blue and green terminals.
⑫ Includes core and mounting clip, part #508784.
⑬ Connect red and blue terminals to terminals #3 and #1 of horizontal output trans., orange and black terminals to AFC network. If the picture is out of phase, reverse orange and black terminals.
⑭ Connect terminals #3 or #4 of width coil to terminals #3 and #1 of horizontal output trans. Terminals #1 and #2 to AFC network. If the picture is out of phase, reverse terminals #1 and #2.
⑮ Connect terminals "C" and "E" of width coil to terminals #3 and #1 of horizontal output transformers. Terminals "A" and "B" to AFC network. If the picture is out of phase, reverse terminals "A" and "B".

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

ORIGINAL TERMINAL CONNECTIONS	Stancor Replacement Connections	Merit Replacement Connections	Triad Replacement Connections	RCA Replacement Connections	Halldorson Replacement Connections	Thordarson Replacement Connections
10			Hi-Volt Rect Plate Lead	Hi-Volt Rect Plate Lead		Hi-Volt Rect Plate Lead
9			9	9		9
7			7	7		7
5			5	5		5
T (NC)			NC	NC		NC
3			3	3		3
1			1	1		1
Connect Width Coil Across	3 & 1		3 & 1	3 & 1		3 & 1

TRANSFORMER (AUDIO OUTPUT)

ITEM No	IMPEDANCE PRI	IMPEDANCE SEC	REPLACEMENT DATA TRUETONE PART No.	Stancor PART No	Merit PART No	Triad PART No	Halldorson PART No	Thordarson PART No	NOTES
T9	4.4KΩ	3.3Ω	509376	A-3877	A-3950	S-5X	Z1001	22S46	

SPEAKER

ITEM No	RATINGS SIZE	RATINGS FIELD	RATINGS V. C. IMP.	REPLACEMENT DATA TRUETONE PART No.	JENSEN PART No.	QUAM PART No.	NOTES
SP1	8 x 9"	PM	3.3Ω	508174	ST-810 Mod. P89-V	69A3	

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA TRUETONE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1A	UHF Ant.Coil	0Ω						
B	UHF Mixer Coil	0Ω						
C	UHF Osc. Coil	0Ω						
L2	UHF Ant. Coil Ind							
	Inductor	0Ω						
L3	UHF Mixer Coil Ind							
	Inductor	0Ω						
L4	UHF Osc. Coil Ind							
	Inductor	0Ω						
L5	FIL. Choke	.2Ω						
L6	FIL. Choke	.2Ω						
L7	Cathode Choke	.1Ω						
L8	UHF IF Coupling	.1Ω						
L9	VHF IF Output Coil	0Ω	0Ω					
L10	RF Choke	.1Ω						
L11A	VHF Ant.Coil	0Ω	CT 0Ω	521822				Channel 2
B	VHF Ant.Coil	0Ω	CT 0Ω	521823				Channel 3
C	VHF Ant.Coil	0Ω	CT 0Ω	521824				Channel 4
D	VHF Ant.Coil	0Ω	CT 0Ω	521825				Channel 5
E	VHF Ant.Coil	0Ω	CT 0Ω	521826				Channel 6
F	VHF Ant.Coil	0Ω	CT 0Ω	521827				Channel 7
G	VHF Ant.Coil	0Ω	CT 0Ω	521828				Channel 8
H	VHF Ant.Coil	0Ω	CT 0Ω	521829				Channel 9
I	VHF Ant.Coil	0Ω	CT 0Ω	521830				Channel 10
J	VHF Ant. Coil	0Ω	CT 0Ω	521831				Channel 11
K	VHF Ant. Coil	0Ω	CT 0Ω	521832				Channel 12
L	VHF Ant.Coil	0Ω	CT 0Ω	521833				Channel 13
M	UHF Strip	0Ω		521821				Used in UHF position only
L12	FIL. Choke	0Ω		520018				
L13	Neutr.Coil	0Ω		520701				
L14A	RF Mixer Grid & Osc. Coils	0Ω		521842				Channel 2
B	RF Mixer Grid & Osc. Coils	0Ω		521843				Channel 3
C	RF, Mixer Grid & Osc. Coils	0Ω		521844				Channel 4
D	RF, Mixer Grid & Osc. Coils	0Ω		521845				Channel 5
E	RF, Mixer Grid & Osc. Coils	0Ω		521846				Channel 6
F	RF, Mixer Grid & Osc. Coils	0Ω		521847				Channel 7
G	RF, Mixer Grid & Osc. Coils	0Ω		521848				Channel 8
H	RF, Mixer Grid & Osc. Coils	0Ω		521849				Channel 9

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (cont)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA TRUETONE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
I	RF, Mixer Grid & Osc. Coils	0Ω		521850				Channel 10
J	RF, Mixer Grid & Osc. Coils	0Ω		521851				Channel 11
K	RF, Mixer Grid & Osc. Coils	0Ω		521852				Channel 12
L	RF, Mixer Grid & Osc. Coils	0Ω		521853				Channel 13
M	UHF Strip	0Ω		521836				Used in UHF position only -includes resistors and capacitor
L15	Fil. Choke	0Ω		520520				
L16	RF Choke	0Ω		521835				
L17	Feedback Coil	1.4Ω		521834				
L18	Conv. Plate	.1Ω		521836				
L19	1st. Video IF Grid	1.1Ω						Includes trap (1.3Ω)
L20	1st. Video IF Plate	1.4Ω						
L21	2nd. Video IF Grid	1.5Ω						
L22A	41.25MC Trap	1.3Ω						
B	47.75MC Trap	1Ω						
L23	3rd. Video IF	2.2Ω	1.5Ω					
L24	4th. Video IF	2.5Ω	2.3Ω					
L25	Series Peaking Coil	8.5Ω		520620	19-3180	TV-184	6180	180 Microhenries
L26	Shunt Peaking Coil	.19Ω		520985	19-3660		4650	650 Microhenries
L27	Series Peaking Coil	1.4Ω		522020	19-1004		4610	8 Microhenries
L28	4.5MC Trap	1.7Ω		509603	20-1004	TV-151	1470	Includes slug & C66, slug part #507357
L29	Series Peaking Coil	9.6Ω		520689	19-3180	TV-184	6180	180 Microhenries-Note 1
L30	Shunt Peaking Coil	15Ω		509342	19-1923	TV-188	4648	394 Microhenries-Note 2
L31	Sound IF	1Ω		509378	16-3445 †	TV-113 †	1470-A	
L32	Ratio Detector	3.9Ω	.8ΩCT	509706	17-3493	TV-115 ■	1498	Tertiary winding-.4Ω
L33	Horiz. Osc.	85Ω		520943	20-1042 ▲	TV-162 ▲	6183 ▲	Includes slug, slug part #521064, pri. tapped ⓐ 60Ω, horizontal waveform winding -44Ω

Note 1. Chassis which do not include the letter "A" in series designation use part #520984 in this application.
Note 2. Chassis which do not include the letter "A" in series designation use part #520986 in this application.
† Use one winding only.
■ Use adaptor plate.
▲ Reverse coil mounting in can.

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D. C. RESISTANCE	RATINGS INDUCTANCE (0 CURRENT 1000 ∿)	REPLACEMENT DATA TRUETONE PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
L34	.270ADC	75Ω	2.9 Hy.	508341	C-2326①	C-2991 ①		C5030	26C44

① Drill one new mounting hole.

FUSES

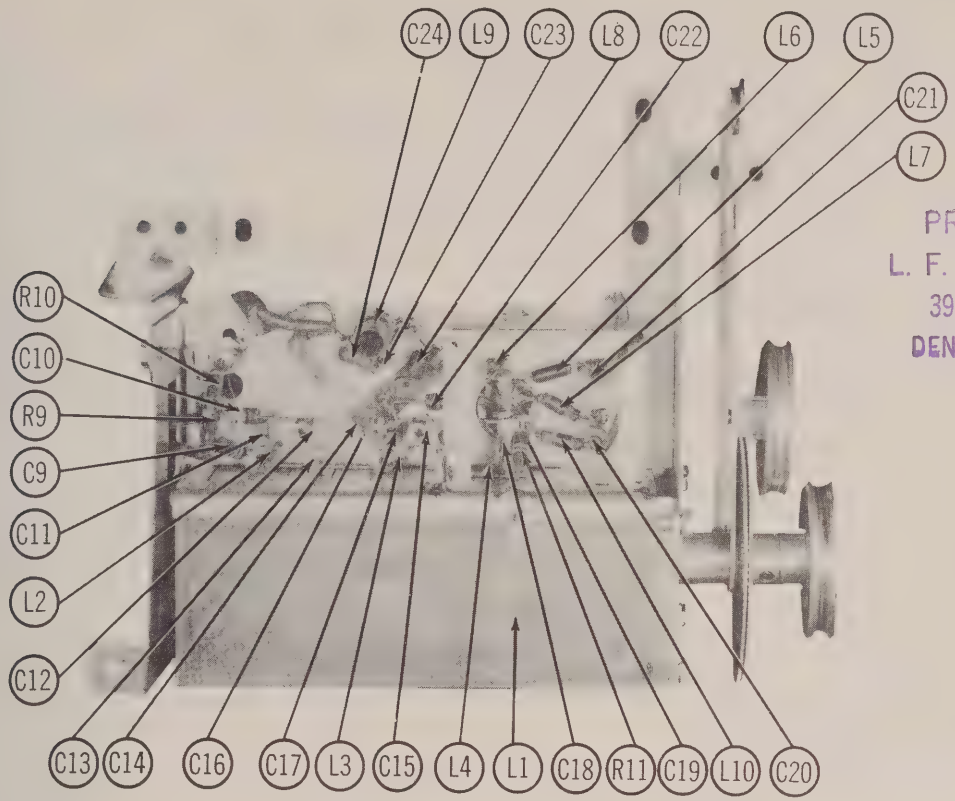
ITEM No.	TYPE	RATING	REPLACEMENT DATA TRUETONE PART No. FUSE	TRUETONE PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M1	3AG Slo-Blo	4A 125V	521803	521734	313004. (3AG-4A S/B)	357002	MDX4	4408
M2	3AG	½A 250V	521752	521734	312. 500 (3AG-½A)	357002	AGC½	4408

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA TRUETONE PART No.	SYLVANIA PART No.	FEDERAL PART No.	NOTES
M3	1N72		1N82 or A		UHF Mixer
M4	1N64	509386	1N132, 1N60	1N64A	Video detector

MISCELLANEOUS

ITEM No.	PART NAME	TRUETONE PART No.	NOTES
M5	Dial Light		#47 Bayonet
M6	Tuner	521187	VHF
M7	Tuner	521170	UHF
M8	Switch	521188	UHF/VHF change-over
M9	Switch	520563	TV-Phono
M10	Ion Trap	521183	
B3	Trimmer Cap.	508071	Horiz. Drive (10-160MMF)
	Cabinet	521861	Mahogany
	Dial	521282	UHF
	Knob	521278	Channel Selector
	Knob	521281	Brightness
	Knob	521279	Off/on volume
	Knob	521932	Tone & power booster
	Knob	521280	VHF fine tuning, UHF tuning
	Safety Glass	520867	



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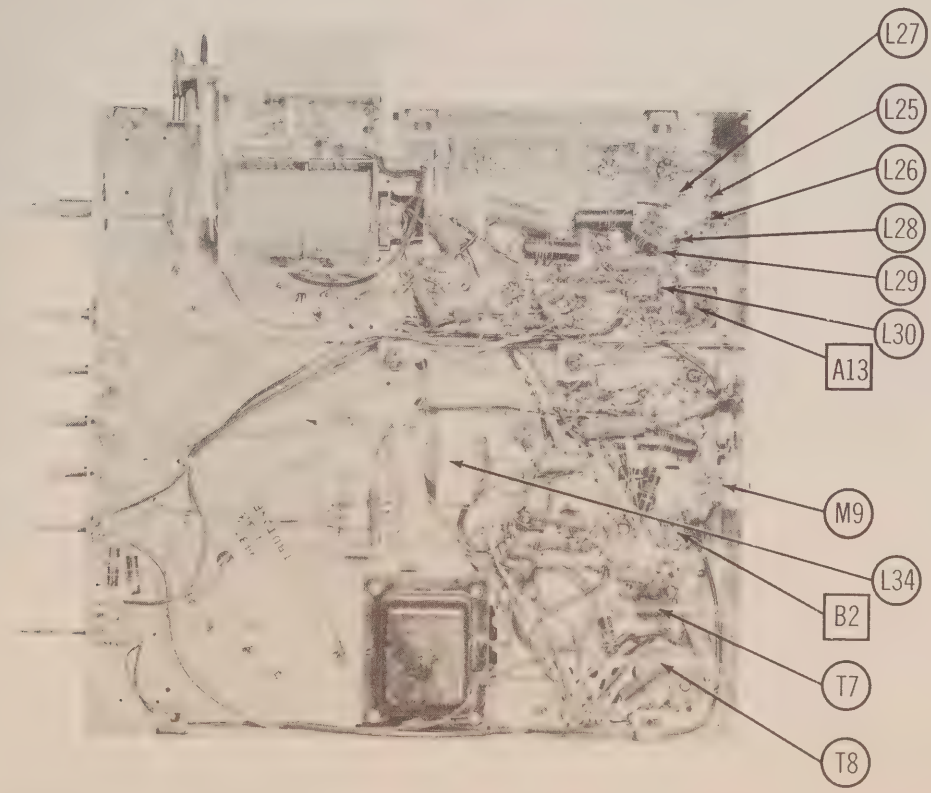
UHF TUNER-BOTTOM VIEW



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

TROUBLE SHOOTING AIDS (cont)

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POWER

DEAD SET

If filaments fail to light, check M1 fuse. Check AC interlock assembly. Check switch on volume control and T1. If filaments light, check V19 and V20. Check B+ filter and decoupling network for failure or change of value.

SMALL AND/OR DIM PICTURE

Substitute V19 and V20. Check B+ filter and decoupling network components.

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V15, V16, V17 and V18. Check M2 fuse. Check waveform W17.

If Satisfactory	If Unsatisfactory
Check T3, T5A, C108, C110, C111, C106, C107, R101, R102, R108, C7 and other associated components.	Check C103, C102, C101, C104, R98, R97, R95, L33 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V15, V16, V17, V18, V19 and V20. Check picture tube. Proceed as outlined under "Loss of High Voltage".

BLOOMING

Check by substitution V16, V17, V18, V19 and V20. Check T3, T5A, C106, C107, R101, R102 and other associated components.

GENERAL

RASTER – SOUND – NO PICTURE

Follow procedure outlined under "Loss of Video".

RASTER – PICTURE – NO SOUND

Follow procedure outlined under "Weak or No Sound".

RASTER – NO SOUND – NO PICTURE

Check by substitution V4, V5, V6 and V7. Check IF and video components. VHF tuner check V2 and V3. UHF tuner check V1.

NO RASTER – NO SOUND

Follow procedure outlined under "Dead Set".

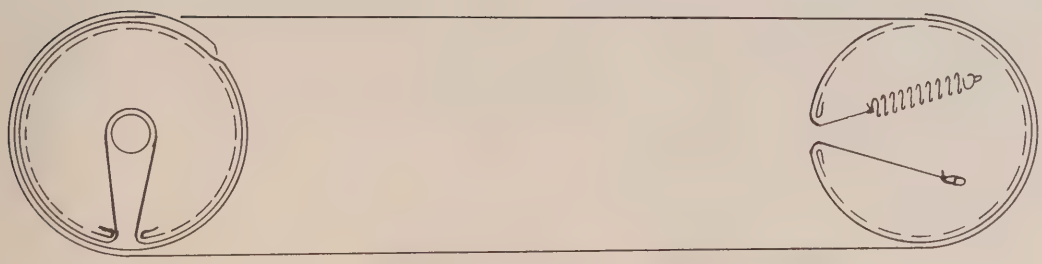
KEYSTONE EFFECT

Check T5, C112, R109, R86, R87.

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.



UHF DRIVE CORD STRINGING

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF Tuner Oscillator Circuit may be accomplished by removal of the Channel Selector and Fine Tuning knobs. The adjustments are accessible, one at a time, through the small hole in the cabinet to the right of the Chennel Selector shaft.

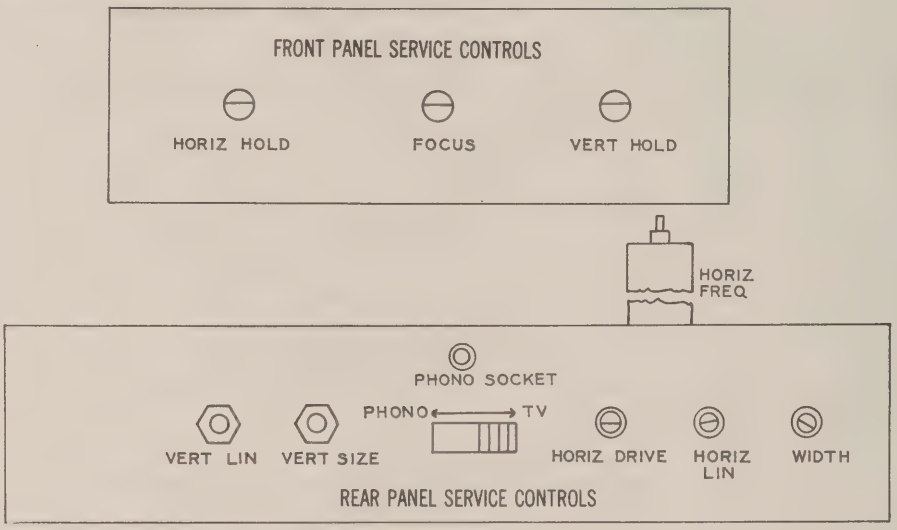
PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass remove four (4) wood screws holding wood strip at the top of the safety glass. Remove wood strip and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions.)

SERVICE ADJUSTMENT LOCATION



HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

For adjustment of the Horiz. Oscillator, it is necessary to remove the rear cover and supply power to set. Adjustment is located on top of chassis. Set the Horiz. Hold control at the center of its range and adjust the Horiz. frequency slug (L33) until, picture synchronizes horizontally. (For location see tube placement chart).

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate Sound IF Detector Buzz, adjust the Ratio Detector Secondary (L32) located on top of chassis. (See tube placement chart.)

FUSES

Two fuses are used. One for Horiz. Sweep Circuit protection and one for L. V. Power Supply protection, (For location, see tube placement chart).

CENTERING

Centering is accomplished mechanically by positioning the focus coil. Adjust the three knurled nuts located on the focus coil bracket until picture is properly centered.

DISASSEMBLY INSTRUCTIONS

1. Remove 7 push on type control knobs from front panel.
2. Disconnect built-in-antenna.
3. Remove 7 wood screws and one metal screw. Remove rear cover.
4. Remove 2 wood screws. Remove transmission line from cabinet rear.
5. Disconnect speaker leads , yoke leads, CRT socket, focus coil plug, and HV lead.
6. Remove ground lead from chassis to picture tube mounting bracket.
7. Remove 5 chassis. bolts. Remove chassis.
8. Remove 4 speaker nuts. Remove speaker.

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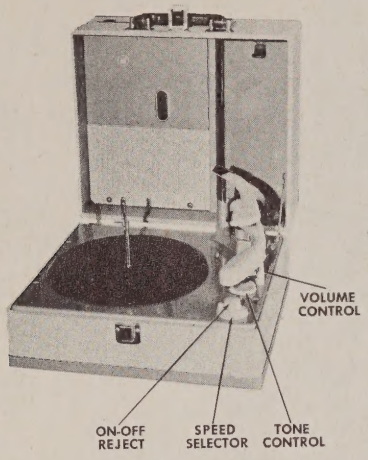

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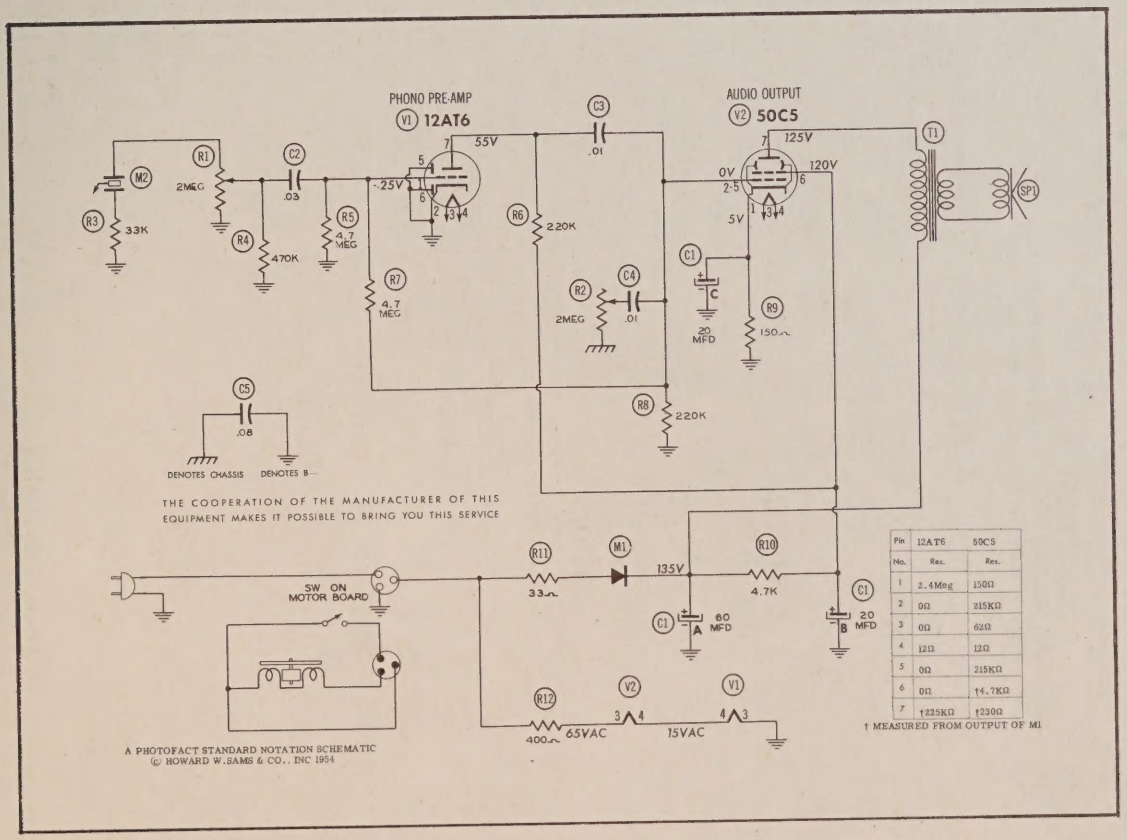
V-M
MODEL 990

TRADE NAME	V-M Model 990
MANUFACTURER	V-M Corp., Benton Harbor, Mich.
TYPE SET	AC Operated Phono Amplifier With 3 Speed Automatic Record Player
TUBES (Two)	Types 12AT6 Pre-Amp., 50C5 Audio Output
POWER SUPPLY	110-120 Volts AC-60 Cycles RATING .23 Amp. @ 117 Volts AC

FOR SERVICE INFORMATION ON RECORD CHANGER UNIT SEE SIMILAR V-M MODEL 950-PHOTOFACT SET 216-FOLDER 11 OR RECORD CHANGER MANUAL CM-5.



Pin No.	12AT6 Res.	50C5 Res.
1	2.4Meg	150Ω
2	0Ω	215KΩ
3	0Ω	62Ω
4	12Ω	12Ω
5	0Ω	215KΩ
6	0Ω	†4.7KΩ
7	†225KΩ	†230Ω

† MEASURED FROM OUTPUT OF M1

V-M
MODEL 990

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: V-M PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	Phono Pre-Amp.	12AT6	12AT6	7BT	
V2	Audio Output	50C5	50C5	7CV	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: V-M PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C1A	60	150	12007			BBRQ422-15C			R1422	Red
B	20	150								Green
C	20	50								Yellow
C2	.003	400	12004	P488-003	D6-302	CUB6D3	GP2-333-302	PT623	6TM-D3	
C3	.01	400	12003	P488-01	D6-103	CUB6S1	GP2-333-103	PT411	4TM-S1	
C4	.01	400	12003	P488-01	D6-103	CUB6S1	GP2-333-103	PT411	4TM-S1	
C5	.08	400	12005						PX186	

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: V-M PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	2Meg	½	11954	Q13-139	A47-2Meg-Z	AB-76	U-55	Volume
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R1A
R2A	2Meg	½	11956	Q11-139	A47-2Meg-S	AB-75	U-56	Tone
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R2A

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: V-M PART No.	IRC PART No.	NOTES
R3	33KΩ	½	11093	BTS-33K	
R4	470KΩ	½	11373	BTS-470K	
R5	4.7Meg	½	11613	BTS-4.7Meg	
R6	220KΩ	½	11293	BTS-220K	
R7	4.7Meg	½	11613	BTS-4.7Meg	

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: V-M PART No.	IRC PART No.	NOTES
R8	220KΩ	½	VM11293	BTS-220K	
R9	150Ω	½	VM10533	BTS-150	
R10	4700Ω	½	VM10893	BTS-4700	
R11	33Ω	½	VM10373		
R12	400Ω	10	VM11957	1 3/4A-400	

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	IMPEDANCE: SEC.	REPLACEMENT DATA: V-M PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	NOTES
T1	2.4KΩ	3.1Ω	12505	A-3332	A-3025	S-1X ①	Z1101	24S50 ①	① Drill one new mounting hole.

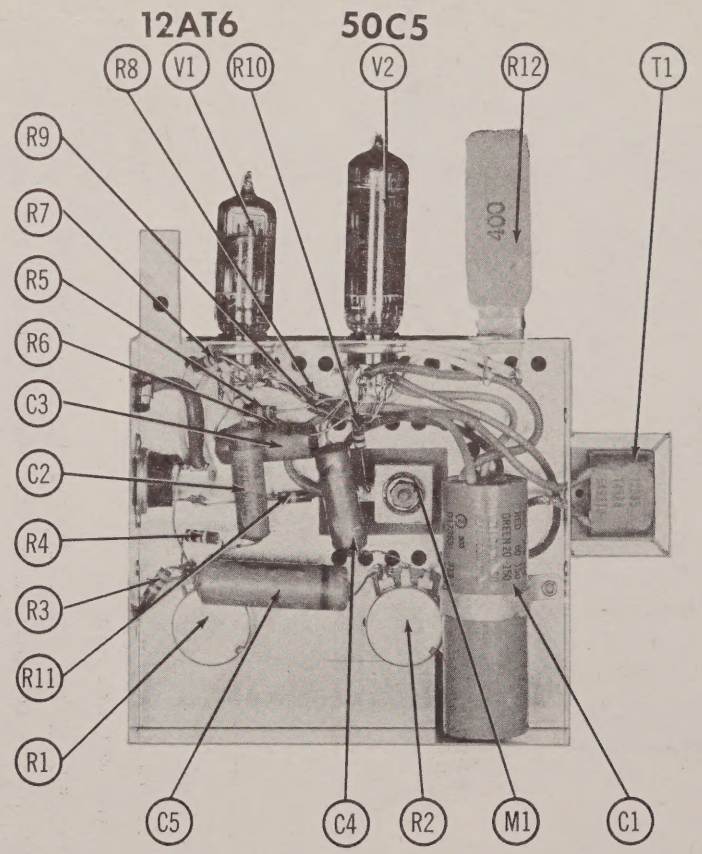
SPEAKER

ITEM No.	RATINGS: SIZE	RATINGS: FIELD	RATINGS: V. C. IMP.	REPLACEMENT DATA: V-M PART No.	VIKING PART No.	QUAM PART No.	NOTES
SP1	4 x 6"	PM	3.1Ω	5593	46J6	46A1	

SELENIUM RECTIFIER

ITEM No.	RATING: CURRENT	REPLACEMENT DATA: V-M PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	SARKES TARZIAN PART No.	SELETRON PART No.	NOTES
M1	.050	5593	1002A	RS65	6S65	65	8J1	

CHASSIS—BOTTOM VIEW



PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA: V-M PART No.	ASTATIC PART No.: CARTRIDGE	ASTATIC PART No.: NEEDLE	SHURE PART No.: CARTRIDGE	SHURE PART No.: NEEDLE	ELECTRO-VOICE PART No.: CARTRIDGE	ELECTRO-VOICE PART No.: NEEDLE	REMARKS
M2	5799					43	0-2	

ELECTRO-VOICE NEEDLE LISTINGS SHOWN ABOVE ARE SPECIFIED FOR THE RESPECTIVE REPLACEMENT CARTRIDGES LISTED. FOR ORIGINAL CARTRIDGE NEEDLE REPLACEMENT SEE BELOW.

PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA: V-M PART No.	JENSEN PART No.	PERMO PART No.	WALCO PART No.	REMARKS
M3		†S-66	†AC-434 (or) †♦AC-434D1 (or) †♦AC-434D2 (or) ♦AC-434D	†W-75TPS	† Jewel ♦ Diamond